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TELEFLEX CANADA LIMITED
PARTNERSHIP

INSTALLATION INSTRUCTIONS

AND OWNER'S MANUAL

www.seastarsteering.com



SeaStar®


Hydraulic Steering for Outboard Powered Vessels

Front Mount Cylinders HC5345, HC5347, HC5348, HC5358, HC5375,
HC5385, HC6750, HC6752, HC6753, HC6754, HC6755
Side Mount Cylinder HC5370 & Splashwell Mount Cylinder HC5380

Now includes
recommendations up to:
350HP

*Before you do it your way,
please try it our way*

Notice to Boat Manufacturer or Installer

Throughout this publication, Warnings and Cautions (accompanied by the International Hazard Symbol ) are used to alert the manufacturer or installer to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly.

Observe Them Carefully!

These “safety alerts” alone, cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the installation and maintenance plus “common sense” operation are major accident prevention measures.

 DANGER	 WARNING	 CAUTION	NOTICE
Immediate hazards which WILL result in severe personal injury or death.	Hazards or unsafe practices which COULD result in severe personal injury or death.	Hazards or unsafe practices which COULD result in minor injury or product or property damage.	Information which is important to proper installation or maintenance, but is not hazard-related.

WARNING

Cleaning fluids containing ammonia, acids or any other corrosive ingredients MUST NOT be used for cleaning any part of this Hydraulic Steering System. Failure to comply will cause serious damage to the steering system, resulting in possible loss of steering, causing property damage, personal injury and/or death.

Don't compromise performance... use genuine SeaStar parts only!

- SeaStar helms
- SeaStar hoses
- SeaStar Cylinders
- SeaStar Oil

Substituting non SeaStar parts in any part of the SeaStar hydraulic steering system, may seriously compromise system performance.

INTRODUCTION

Before proceeding with the installation, read these instructions thoroughly. Teleflex cannot accept responsibility for installations where instructions have not been followed, where substitute parts have been used, or where modifications have been made to our products.

NOTICE

Due to a small amount of internal hydraulic slip, a “master spoke” or “centered” steering wheel cannot be maintained with a hydraulic steering system. For best results, use an equal distance spoke steering wheel. SeaStar Pro Helm Pumps are not 100% locking and therefore, a small amount of hydraulic drift is normal.

WARNING

DO NOT use a wire coil type trim switch with a hydraulic steering system. Wire coil can wind up tight around the steering wheel shaft and prevent further steering!

Pro Trim offers fingertip trim or jackplate control with a column-mounted switch, enabling you to keep both hands on the steering wheel and concentrate on your driving. Pro Trim PT1000 controls trim or jackplate only. Pro Trim Dual PT2000 controls both functions.

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BEFORE OPERATING YOUR BOAT

Ensure that the following check list is carried out

- 1 Perform system pressure test by turning helm all the way to hard over and then forcing the helm another 1/4 to 1/2 turn.
This should be done in both directions. This will pressurize the system. Any weakness in the system should show up at this time.
- 2 Confirm that extruded nylon tubing has **NOT** been substituted for SeaStar Hydraulic Steering Hose.
- 3 Confirm that there is no interference between the steering cylinder and the transom, splashwell or jackplate or any combination of these parts by performing these simple steps:
 - With engine fully tilted, turn steering from hard over to hard over and confirm that no interference occurs. If you are using a hydraulic jack plate this also must be performed at the top and bottom position of the jack plate.
(If interference is present, it must be eliminated with Trim limiting switches and/or jack plate lift restrictors. Contact jack plate manufacturer for advice if required.)
 - Confirm that the steering cylinder can be stroked fully in both directions as well as full tilt and trim without stretching and/or kinking the hydraulic hoses.
 - Confirm that the hydraulic hoses are not subjected to chafing or rubbing.
 - Stretched, kinked or chafed hose will fail over a period of time.

⚠ WARNING

Failure to comply with above may result in loss of steering, causing property damage and/or personal injury

Before attempting installation, ensure that the splashwell of your boat has the following minimum dimensions.

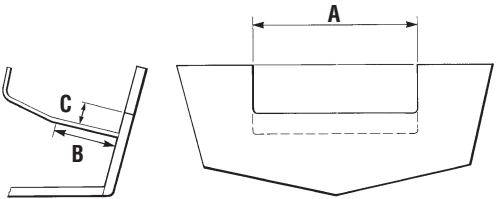
Minimum Splashwell Dimensions

# OF ENGINES	A	B	C	MIN. ENGINE CENTER DISTANCE
1	22" (559mm)	6" (152mm)	5" (127mm)	N/A
2	44" (1118mm)	6" (152mm)	5" (127mm)	26" (660mm)

NOTE:

a) Dimensional restrictions also apply to external motor mount brackets.

b) Maximum engine center distance for twin engine applications is 36" (914mm) using the standard tie bar. Dimension 'A' would have to be increased proportional to the tie bar length.



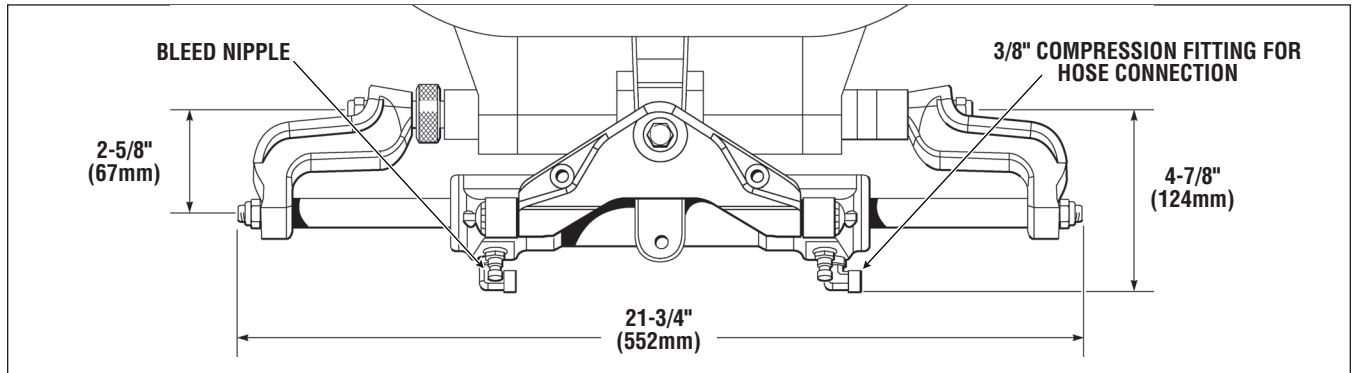
Front Mount Cylinder

(Part # HC5345, HC5347, HC5348, HC5358, HC5375, HC5385, HC6750, HC6752, HC6753, HC6754, HC6755)

Splashwells of less than 30" in overall width may require engine removal in order to install the support rod (part # 730229).

NOTICE

Dimensions shown are the same for all part numbers. Pivot plate dimensions vary between part numbers.

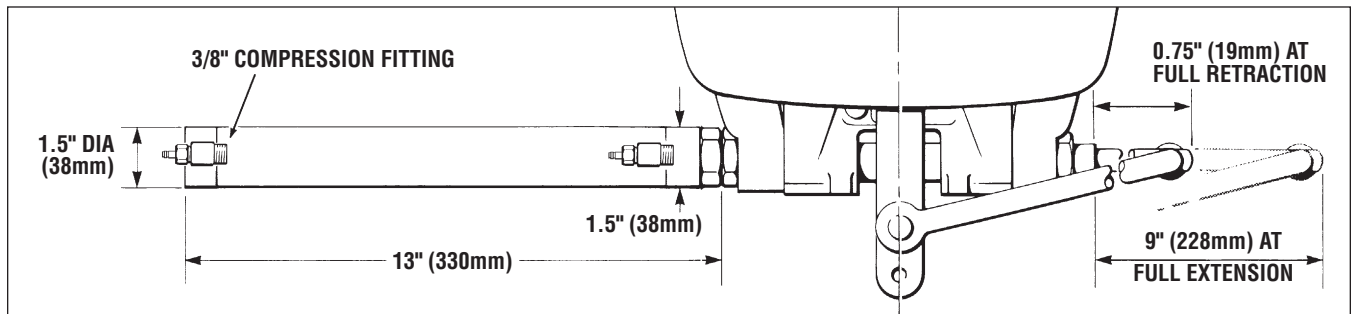


Side Mount Cylinder

(Part # HC5370)

Side mount cylinders require a minimum clearance of 14" (355 mm) from the end of the tilt tube to the motor well wall (or gunwale) for proper installation and operation.

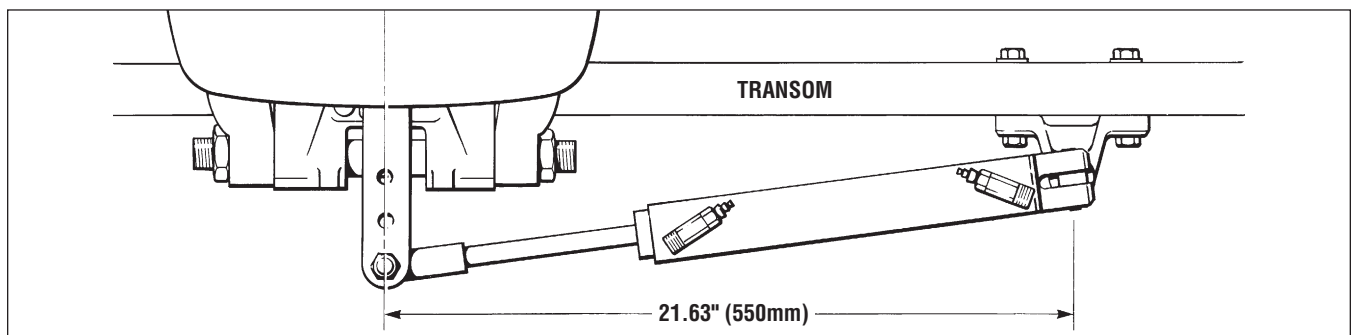
Minimum engine centers for twin engines is 26" (660 mm).



Splashwell Mount Cylinder

(Part # HC5380)

The Splashwell Mount Cylinder can be used on all outboard engines complying with ABYC P17 / NMEA / BIA standards provided they have a 3/8" x 24 UNF thread in the steering arm. Not suitable for use on engines fitted with factory power steering.



⚠ CAUTION

DO NOT use the SeaStar PRO Helms with side mount cylinder HC5370 or splashwell mount cylinder HC5380 as they are incompatible with ALL unbalanced cylinders.

300HP + Installation Recommendations

With the introduction of heavier, higher horsepower engines producing more torque, Teleflex Marine has updated its recommendations across various applications (single and multiple engines, different hull types, etc.) Please read carefully to ensure that your current steering system provides the best comfort versus performance available.

ENGINE	SEASTAR FRONT MOUNT <i>(Normal Use)</i>	SEASTAR FRONT MOUNT <i>(Aggressive Use - See Note 1)</i>	HYNAUTIC K-6 <i>(Normal Use ONLY)</i>
SINGLE ENGINE	SINGLE CYLINDER 350 HP Max 75 MPH Max HC53xx Cylinder <i>(See Note 2)</i>	SINGLE CYLINDER 350 HP Max HC63xx Pro Cylinder <i>(See Notes 2 & 3)</i>	SINGLE CYLINDER 300 HP Max 55 MPH Max
DUAL ENGINE NON COUNTER ROTATING	SINGLE CYLINDER 450 HP Max 55 MPH Max HC53xx Cylinder HO60xx Tie Bar	SINGLE CYLINDER Not Recommended	SINGLE CYLINDER 400 HP Max 55 MPH Max
	DUAL CYLINDER 600 HP Max 55 MPH Max HC53xx Cylinders HO60xx Tie Bar	DUAL CYLINDER 700 HP Max HC67xx Cylinders <i>(See Notes 2 & 4)</i> HO67xx Tie Bar	DUAL CYLINDER 500 HP Max 55 MPH Max
DUAL ENGINE COUNTER ROTATING	SINGLE CYLINDER 600 HP Max 55 MPH Max HC53xx Cylinder HO60xx Tie Bar	SINGLE CYLINDER Not Recommended	SINGLE CYLINDER 500 HP Max 55 MPH Max
	DUAL CYLINDER 600 HP Max 55 MPH Max HC53xx Cylinders HO60XX Tie Bar	DUAL CYLINDER 700 HP Max HC67xx Cylinders <i>(See Notes 2 & 4)</i> HO67xx Tie Bar	DUAL CYLINDER 500 HP Max 55 MPH Max
TRIPLE ENGINE ONE WITH COUNTER ROTATING	DUAL CYLINDER 900 HP Max 55 MPH Max HC53xx Cylinders HO60xx Tie Bar	DUAL CYLINDER 1050 HP Max HC67xx Cylinders <i>(See Notes 2 & 4)</i> HO67xx Tie Bars HA67xx Center Engine <i>(See Note 2)</i> Bracket Kit	NOT RECOMMENDED
	TRIPLE CYLINDER 900 HP Max 55 MPH Max HC53xx Cylinders HO60xx Tie Bar	TRIPLE CYLINDER 1050 HP Max HC67xx Cylinders <i>(See Notes 2 & 4)</i> HO67xx Tie Bars	NOT RECOMMENDED

1 Teleflex has specific steering equipment for boats that are driven aggressively, used in severe conditions or with more than 300 HP per engine.
 2 **ALL ENGINES** over 300 HP and all boats that are driven aggressively must use a high strength tiller bolt, kit part # HA5822. All front mount cylinders built after June 15, 2007 will have this high strength bolt included in the box. High strength tiller bolts can be identified by the marking "TFX -ARP" on the head of the bolt (refer to NOTICE page 3-5).

3 HC63xx PRO Cylinders are designed for all those critical high speed, single outboard engine boats, such as Bass, Flats combo Race/Ski and other performance orientated boats capable of speeds in excess of 65 mph. For optimal performance, the use of SeaStar PRO Kevlar Steering Hoses is recommended.
 4 HC67xx Tournament cylinders are designed for use with high powered fishing/sport boats. If your application calls for dual or triple outboard engines, is capable of speeds exceeding 55 mp/h and runs ion open water, Tournament Cylinders should be used.

Tools

You will need the following tools to complete your installation.

- 3" (77mm) diameter Hole Saw or Key Hole Saw
- 5/16" (8mm) dia. Drill Bit
- 7/16", 9/16", 5/8" and 3/4" Open End type Wrench/Spanner
- 15/16" Socket for SeaStar Helms

Additional tools needed

20° Mount Wedge

- Key Hole or Sabre Saw
- 5/16" (8mm) dia. Drill Bit
- 1/2" Wrench/Spanner, Box or Open End type
- 7/16" Socket and Drive

Cylinder, Outboard Front Mount Type

- 5/8", 3/4", 1/2", 9/16" Wrench/Spanner, Box or Open End type, 2 required.
- 5/32" Allen Key/Wrench

Cylinder, Side Mount / Splashwell Mount Type

- 1-5/16" Wrench/Spanner, Open or Adjustable type
- 3/16" Allen Key/Wrench
- 3/8" Drill Bit

CAUTION

Lightly lubricate threaded fasteners before installing. This will prevent them from seizing.

Lubricate support rod and all moving parts with a quality marine grease such as Johnson/Evinrude Triple Guard, Quicksilver Anti-corrosion, Yamaha Marine Grease or equivalent.

DO NOT remove protective caps from fittings and fitting ports until hose or tube connections are made. Contaminants in the steering system may cause premature wear and steering malfunctions.

DO NOT use the SeaStar PRO Helms with side mount cylinder HC5370 or splashwell mount cylinder HC5380 as they are incompatible with ALL unbalanced cylinders.

MOUNTING THE HELM

⚠ CAUTION

If a 20° mounting wedge is used, cut out dash as per mounting wedge template and mount helm directly to the 20° wedge.

⚠ CAUTION

If more than one steering station is installed, the fill-vent plug on all but the uppermost helm must be replaced with a non-vent plug which is included in a dual station fitting kit as shown on page 46.

Mount the SeaStar/SeaStar Pro helm to the dash as required for your model application. Refer to fig. 1,2,3,4 or 5 and use appropriate mounting template.

The helm may be mounted with the helm shaft horizontal, vertical or any angle in between.

The filler plug must always be in the uppermost position.

Determine desired mounting position. Ensure that the steering wheel will not interfere with other functional equipment. Check for adequate space behind dash for fitting and line connections.

⚠ WARNING

Use only self-locking fasteners provided; substituting non-self locking fasteners can result in loosening or separation of equipment and loss of steering control.

DO NOT exceed 110 in./lbs. (12 Nm) torque on helm, wedge nuts and bolts.

Install elbow fittings (pre-installed on SeaStar Pro) supplied with helm to ports marked S and P. See Caution below.

⚠ CAUTION

Fittings inserted in the rear of the helm should be installed until finger tight and then turned an additional 1-1/2 to 2-1/2 turns depending on desired orientation of fitting. DO NOT exceed 156 in./lbs (17.6 Nm).

NOTICE

Ports marked R are for the connection of additional helm and autopilot compensating lines. Straight connectors may be substituted.

Use a pipe sealant such as Loctite P.S.T. or equivalent on all pipe threads. **DO NOT use "tape" sealers.**

Mount helm to dashboard or console and lightly **grease taper of helm shaft.**

Mount steering wheel to helm.

⚠ CAUTION

Tighten steering wheel shaft nut before filling & purging the steering system. Tighten nut to 150 in./lbs. (17 Nm). DO NOT exceed 200 in./lbs. (22 Nm).

NOTICE

Tilt helm mounting instructions supplied separately with tilt helm.

Standard Helm Mounting Configuration

(Maximum wheel size 28".)

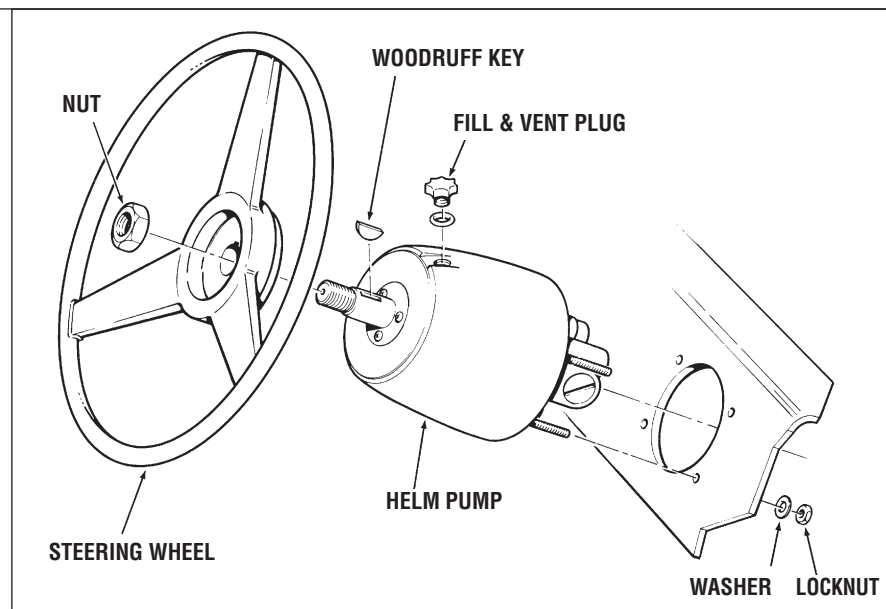


Figure 1

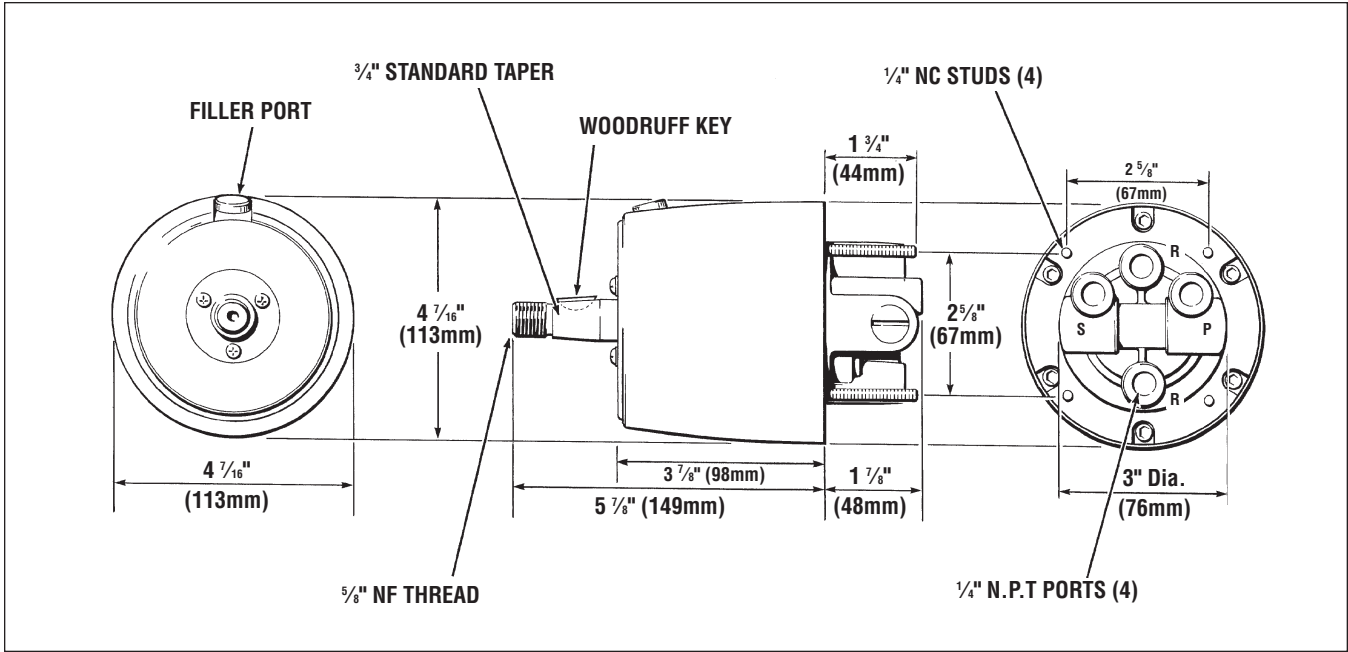


Figure 1a

Back Mount Kits

- a) Used to retrofit a new SeaStar/SeaStar Pro standard helm in the old 4.5" (115 mm) diameter hole.
- b) or reduce the helm protrusion from the dash by the height of the pump body.
- c) or retrofit new SeaStar/SeaStar Pro standard helm into hole cutouts for mechanical and hydraulic steering as per chart.

STEERING MANUFACTURER	HELM MODEL TYPE	SYSTEM	BACKPLATE KIT REQ
TELEFLEX	SAFE-T	MECHANICAL	YES
	BIG-T	MECHANICAL	YES
	ROTARY	MECHANICAL	YES
	RACK AND PINION	MECHANICAL	NO
	SYTEN	HYDRAULIC	YES
MORSE	ROTARY	MECHANICAL	NO
	RACK AND PINION	MECHANICAL	NO

Rear Mount Helms

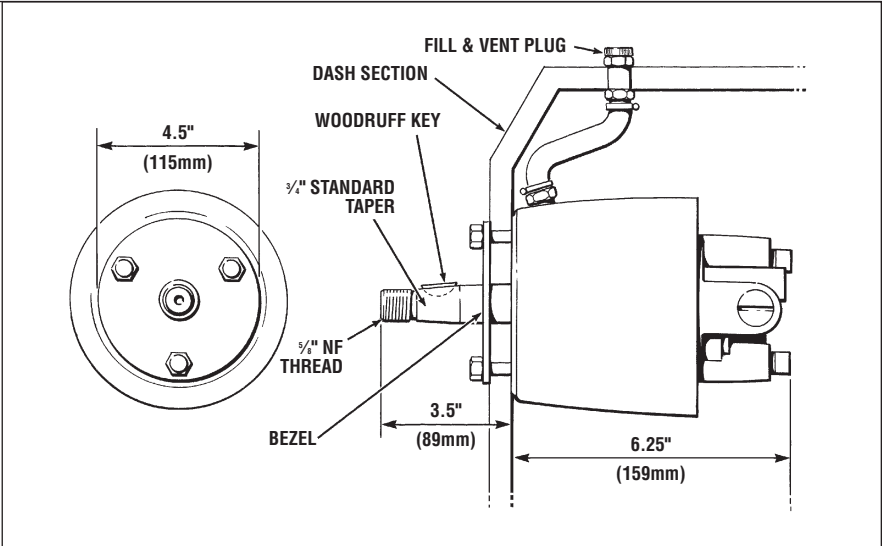


Figure 2

Back Mount Kit Square

(Part # HA5418)

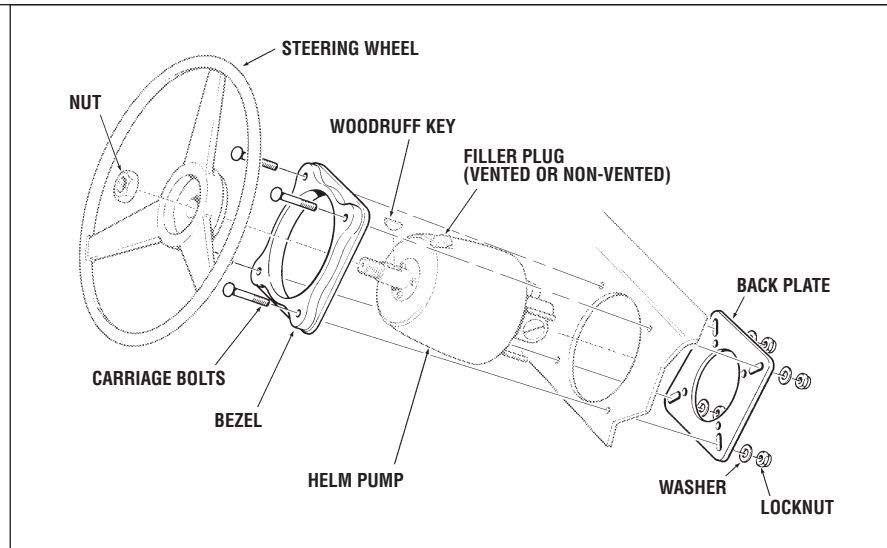


Figure 3

Back Mount Kit Round

(Part # HA5417)

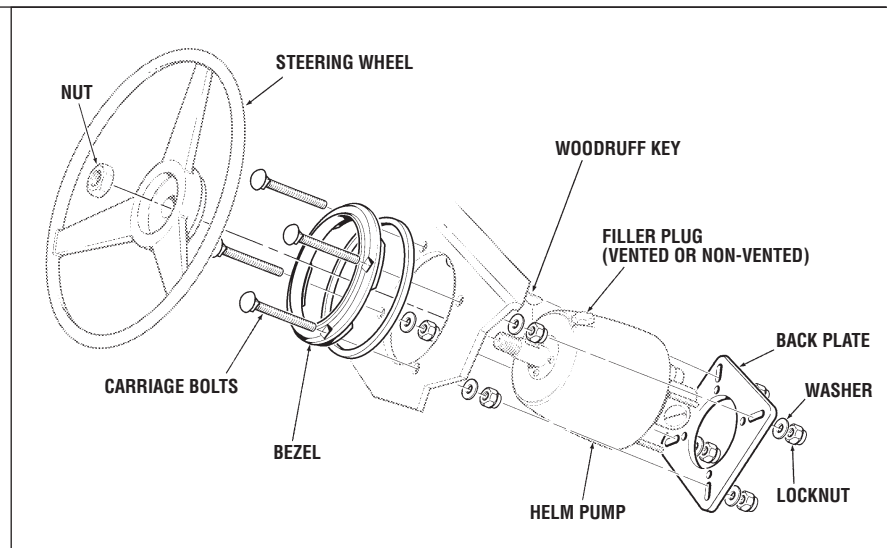


Figure 4

20° Wedge (Part # HA5419 & HA5408 c/w Drain kit)

This kit is designed to mount the helm at a 20° angle to the mounting surface. Four possible mounting configurations are available.

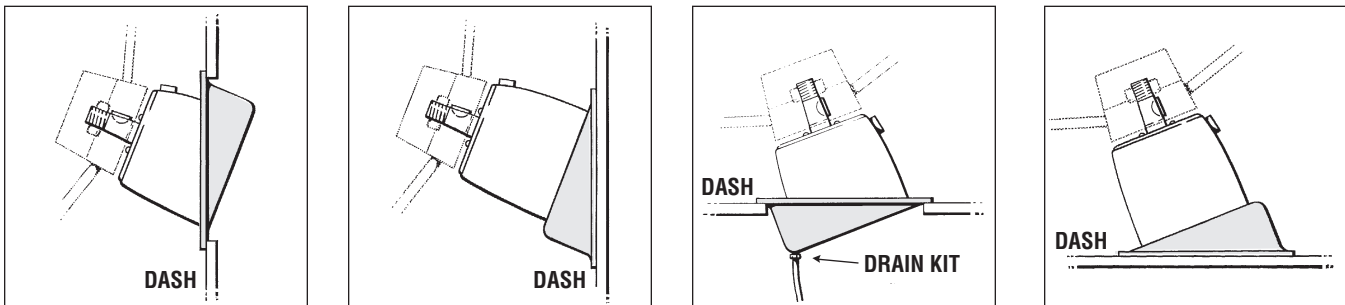


Figure 5

▲ For this configuration use HA5408

HYDRAULIC HOSE INSTALLATION

⚠ CAUTION

For twin steering station installations, e.g.: tower boats, use SeaStar Pro outboard hose or a combination of 3/8" O.D. copper tube (for the long runs).

Plan ahead: Future installation of an auto pilot or extra steering station can be simplified by installing two pairs of shorter hose kits. Connect them with union coupling fittings, part no. HF5530. Tee fittings can now be installed with ease at a later date.

Bulkhead union fitting kits are available to facilitate hose runs through transoms and splashwells.

Part No. HF5512, up to 3/4" (19 mm) splashwell, single cylinder

Part No. HF5513, up to 3" (76 mm) transom, single cylinder

Part No. HF5514, up to 3/4" (19 mm) splashwell, twin cylinders

* Part No. HF5515, up to 3" (76 mm) transom, twin cylinders

* Part No. H081XX, Standard Pigtail hose kit

Part No. H082XX, Sea Star Pro Pigtail hose kit

*XX = hose length in even foot increments

Route hydraulic hose from helm to cylinder(s) along gunwale or builder installed harness tube. **DO NOT remove protective fitting caps until connection of hose fitting to helm and cylinder is made.**

Use shortest convenient path for routing hoses.

Route hoses with a gradual rise from the SeaStar helm pump to the SeaStar Cylinder(s) along the gunwale or builder installed conduit.

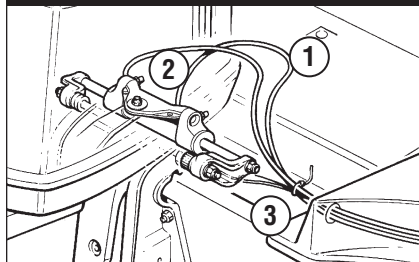
DO NOT bend Hydraulic hoses tighter than a 3-1/2" (89mm) radius.

NOTICE

For replacement installations use old steering cable or hose to pull new hoses through difficult to reach areas.

Thread hose fitting onto fitting at rear of Helm pump and tighten or torque to 15 ft-lbs. Thread cylinder end of hydraulic hose onto steering cylinder fitting (tee/elbow) and torque or tighten to 15ft-lbs.

⚠ WARNING



- 1 Minimum bend radius 3½" (89mm).
- 2 DO NOT adjust angle of fittings without first consulting manufacturer.
- 3 Hoses should be secured to the control cable harness as they enter the splashwell through the boot.

Hydraulic hoses must be protected from chafing and any possible contact or interference with assembly screws or sharp edges of any type. The hydraulic hoses should be secured wherever possible. Teleflex recommends the use of a rigging tube, PVC piping or conduit for the safe secure installation of hydraulic hoses.

DO NOT allow hoses to hang free in an area where they could become a safety hazard.

DO NOT install hoses in such a way that they will become exposed to high heat areas such as engine manifolds or highly corrosive areas such as battery fumes or electrical connections.

Continuous kinking, chafing, rubbing or twisting may eventually weaken hose(s) to a point where it could rupture from normal steering pressure causing loss of steering, resulting in damage to boat and/or personal injury. Visually inspect hoses and fittings for wear and/or damage.

⚠ CAUTION

Prevent mix-up in hose connections by marking both ends of one hose with masking or electrical tape. For two steering stations or an auto pilot installation, a third (compensating) line must be installed and identified. Refer to page 46.

Provide sufficient hose length to allow full uninterrupted steering motion including trim and tilt. If your splashwell is rated for a dual application you must provide enough steering hose to rig either twin or single engines.

⚠ WARNING

DO NOT use extruded nylon tubing for outboard motor applications.

INSTALLATION INSTRUCTIONS

NOTICE

Installation of the Tournament Type and PRO Series steering cylinders is identical to the front mount steering cylinders. Notes will be made when differences may occur.

Front Mount and Tournament Type Cylinders (HC5345, HC5347, HC5348, HC5358, HC6345, HC5375, HC5385 & Tournament Type HC6750 through HC6755.)

On the following pages of this instruction booklet you will find the assembly drawing for your specific application.

NOTICE

Before beginning installation make sure that all mounting hardware is included and that the tiller arm and the tilt tube bolt holes are clean and free from rust or burrs.

⚠ CAUTION

Engines with rigid engine mounts have been shown to cause premature wear to the pivot cylinder — therefore, please perform a complete inspection of your steering system as outlined in the Maintenance Section at the back of this manual.

Single Engines

⚠ WARNING

Refer to page 55 for the correct torque specifications for your installation. Failure to correctly install your steering cylinder and torque all screws may result in steering failure causing property damage and/or personal injury.

NOTICE

Please refer to the table below if using any PRO, Catamaran or Tournament Type Cylinders. Installation will be the same as that shown, any changes will be noted when required.

Cylinder Part #	Install as per Cylinder Part #
HC6345	HC5345
HC5375	HC5345
HC5385	HC5358
HC6750 to HC6752	HC5345
HC6753 to HC6755	HC5358

STEP 1: Using an approved quality marine grease (such as Johnson/Evinrude triple guard, Quicksilver anti-corrosion, Yamaha marine grease or equivalent), liberally lubricate the tilt tube and support rod (Item 9) and slide the support rod through the engine tilt tube.

STEP 2: Lightly grease the tiller bolt (Item 2) & partially screw into appropriate hole in the tiller arm to assure a proper fit. Remove and go to Step 3.

⚠ WARNING If the engine manufacturer has installed caps, plugs and/or screws into the tiller arm, these caps, plugs and/or screws **MUST** be removed prior to continuing on with installation.

STEP 3: Select appropriate insert diagram from Fig. 6 through 13 to determine proper orientation of the cylinder assembly, the tiller bolt and self locking nut (Items 13, 2 and 1). Grease tiller bolt as indicated and fully thread tiller bolt (Item 2) into the steering arm. While holding the head of the tiller bolt with a wrench, tighten and torque tiller nut (Item 1) as specified in this manual.

⚠ WARNING It is highly recommended that the tiller bolt head is held in place with a wrench while the tiller nut is torque to the proper specification, failure to do so may result in loss of steering control causing property damage, personal injury and/or death.

STEP 4: a) Screw the adjusting nut (Item 10) onto tilt tube. b) Place the stainless washers (Item 11) and the plastic spacers (Items 7 & 8) on the support rod.

⚠ CAUTION Refer to figure 6 through 10 for proper orientation of spacers on both sides of the engine tilt tube.

STEP 5: Attach and secure support brackets (Item 12) to the support rod and the cylinder shaft. Tighten using the nuts, bolts and washers (Items 3, 4, 5 & 6) as illustrated in figure 6 through 13.

STEP 6: Eliminate the free play in the support rod by turning the adjusting nut (Item 10) counter clockwise until snug. Never use a wrench on the adjusting nut. Always hand tighten. Lock the adjusting nut in place by tightening the Hexagon set screw.

⚠ CAUTION

If installing a jack plate make sure that there isn't any interference between the jack plate and your steering cylinder. If there is interference, it may occur during full tilt and you should install lift restrictors (Tilt Stop Switch). Some engine manufacturers supply these as standard equipment.

INSTALLATION INSTRUCTIONS

SINGLE ENGINE

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
FORCE	1985 TO 1994 1995 TO DATE	90–150 HP 90–120 HP	HC5345 HC5345	(See Fig. 6a)
HONDA	1992 TO DATE 1996 TO DATE 1998 TO DATE 2001 TO DATE	30–50 HP 75–90 HP 115–130 HP 150–225HP 4 Stroke	HC5345 HC5345 HC5347 HC5345	Requires Spacer Kit HO5090 (See Fig. 6a) (See Fig. 6a) Ref. page 15 for Installation Instructions (See Fig. 6b)

Figure 6

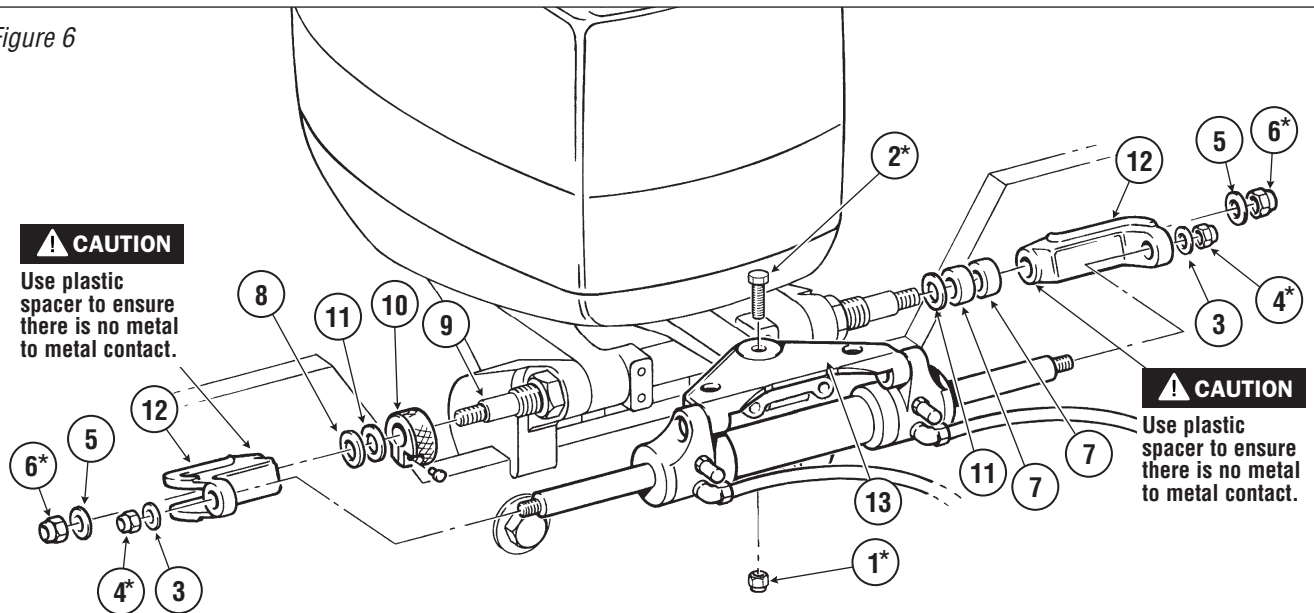
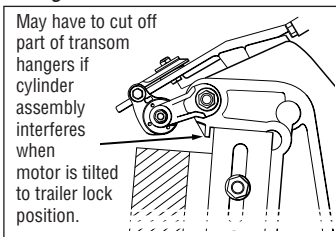
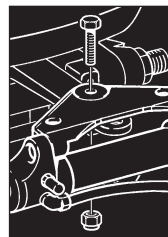


Figure 6a



Honda 75/90 to 1998

Figure 6b



Honda 150–225HP
4 STROKE

WARNING

Fully tilting the engine may cause the steering cylinder to interfere with the transom and/or splashwell. Possible damage to the steering system can result. Ensure that the cylinder is free from interference at all times.

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113225	1	HHCS 3/8UNJFX1.35 HSS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	202027	2	Washer, Flat 1/2" SS
*6	192126	2	Nut 1/2" NF Nylok® ni plt br
7	995876	2	Spacer, Thick, Plastic
8	996689	1	Spacer, Thin, Plastic
9	730229	1	Support Rod

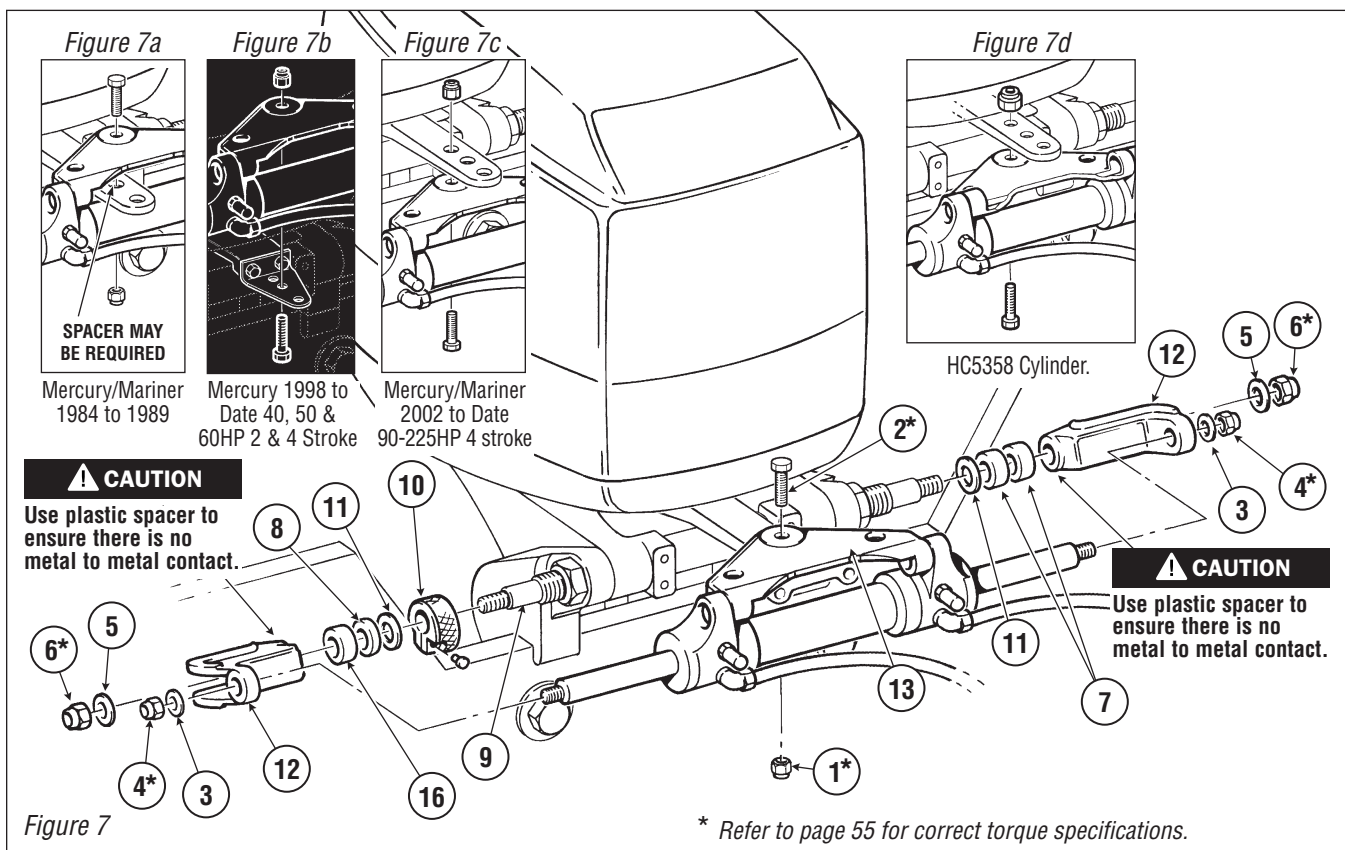
ITEM	PART #	QTY	DESCRIPTION
10	828085	1	Adjusting Nut & Screw SS, Teflon Coated
11	202300	2	Washer, Flat 5/8" SS
12	839120	2	Support Brackets
13	444005	1	Pivot Mount Cylinder
14	728994	1	Spacer, Medium (Not Used)
15	113330	1	HHCS 3/8" NF x 1-3/8" SS

INSTALLATION INSTRUCTIONS

SINGLE ENGINE

⚠ WARNING Refer to on page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
MERCURY/MARINER	1984-TO 1989	75-275 HP	HC5345	(See Fig. 7a)
	1990-TO DATE	75-275 HP	HC5345	
	1995-TO 1997	40, 50 & 60 HP	HC5345	Requires Spacer Kit H05090
	1998-TO DATE	40, 50 & 60 HP	HC5345	Requires Spacer Kit H05090 (See Fig. 7b)
	2002-TO DATE	250 XS HP	HC5345	Must use high strength tiller bolt, Kit HA5822
	2002-TO DATE	90-225HP 4 Stroke	HC5345	(See Fig. 7c)
	2002-TO DATE	90-225HP 4 Stroke	HC5358	Optional Cylinder (See Fig. 7d)
NISSAN	1990-TO DATE	120-140 HP	HC5345	
TOHATSU	1990-TO DATE	120-140 HP	HC5345	



ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113225	1	HHCS 3/8UNJFX1.35 HSS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	202027	2	Washer, Flat 1/2" SS
*6	192126	2	Nut 1/2" NF Nylok® ni plt br
7	995876	2	Spacer, Thick, Plastic
8	996689	1	Spacer, Thin, Plastic
9	730229	1	Support Rod

ITEM	PART #	QTY	DESCRIPTION
10	828085	1	Adjusting Nut & Screw SS, Teflon Coated
11	202300	2	Washer, Flat 5/8" SS
12	839120	2	Support Brackets
13	444005	1	Pivot Mount Cylinder
14	728994	1	Spacer, Medium (Not Used)
15	113330	1	HHCS, 3/8" NF x 1-3/8" SS
*16	H05090	n/a	Refer to page 39 for specific spacer installation instructions.

INSTALLATION INSTRUCTIONS

SINGLE ENGINE

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
JOHNSON/EVINRUDE	1977 TO 1990	65–300 HP	HC5348	Refer to page 16 for Installation Instructions Refer to SeaStar Book 1 See Fig. 8a. <i>Includes ETech</i>
	1977 TO 1988	250–300 HP, V8	HC5342	
	1991 TO DATE	40–250 HP	HC5345	
	1997 TO DATE	75-250 HP FICHT	HC5345	Refer to Figure 11d on page 14 for Installation Instructions. Requires Spacer Kit H05090
	1998 TO DATE	40–140 HP 4 Stroke	HC5358	

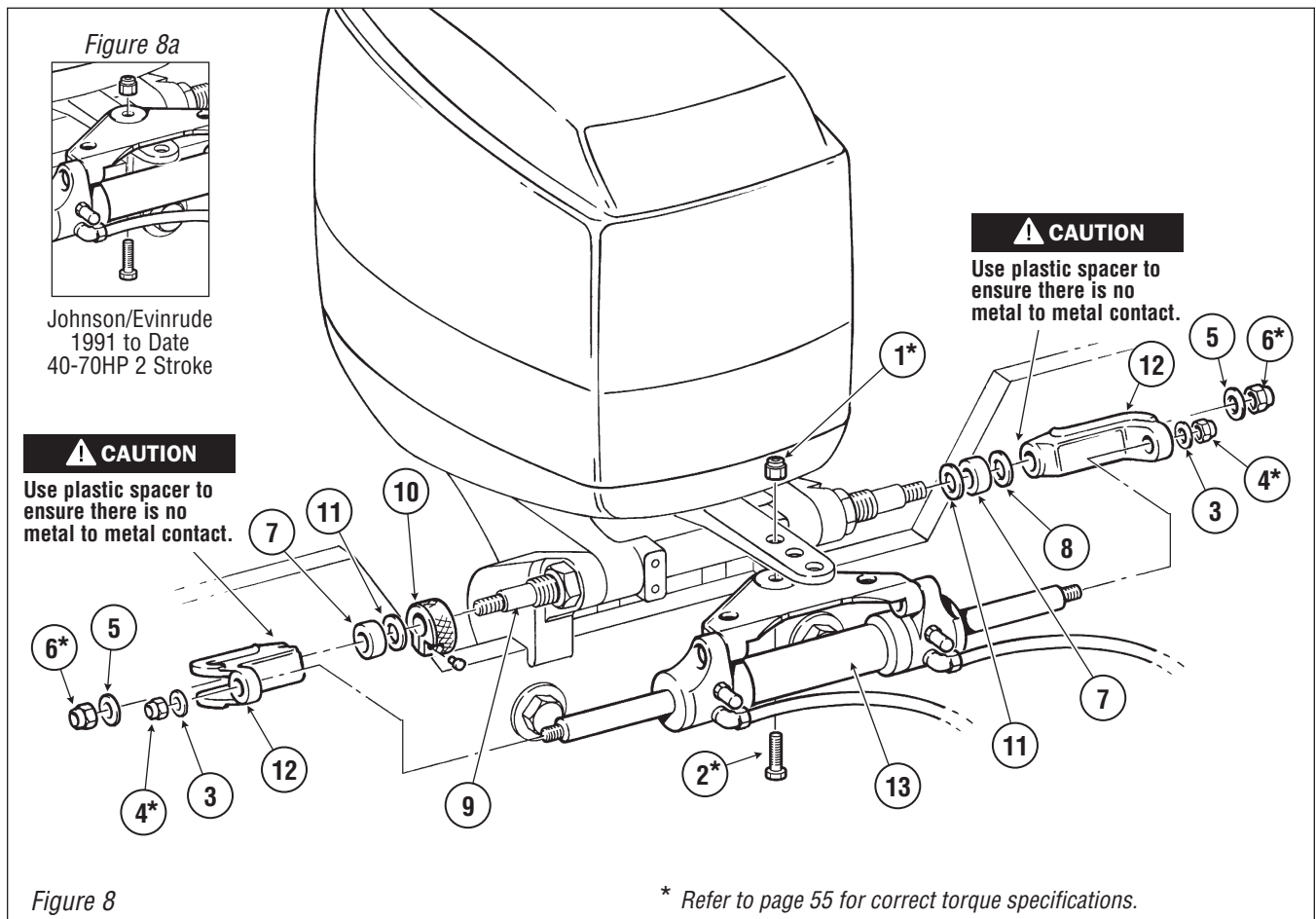


Figure 8

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113225	1	HHCS 3/8UNJFX1.35 HSS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	202027	2	Washer, Flat 1/2" SS
*6	192126	2	Nut 1/2" NF Nylok® ni plt br
7	995876	2	Spacer, Thick, Plastic
8	996689	1	Spacer, Thin, Plastic
9	730229	1	Support Rod

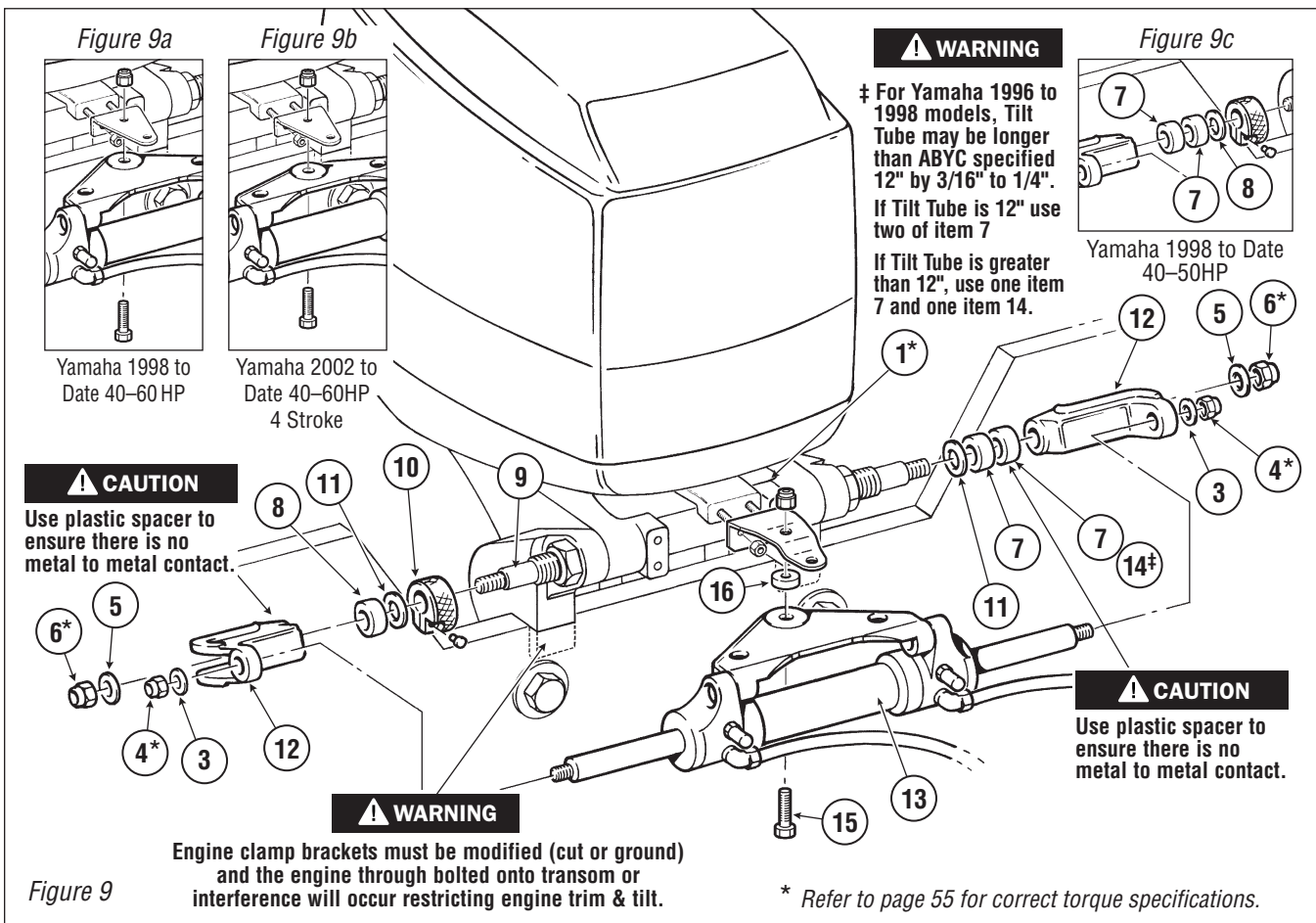
ITEM	PART #	QTY	DESCRIPTION
10	828085	1	Adjusting Nut & Screw SS, Teflon Coated
11	202300	2	Washer, Flat 5/8" SS
12	839120	2	Support Brackets
13	444005	1	Pivot Mount Cylinder
14	728994	1	Spacer, Medium (Not Used)
15	113330	1	HHCS, 3/8" NF x 1-3/8" SS

INSTALLATION INSTRUCTIONS

SINGLE ENGINE

⚠ WARNING Refer to on page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
YAMAHA	1998 TO DATE	40-50HP	HC5345	Engine clamp brackets must be modified (cut or ground) and the engine through bolted onto transom or interference will occur restricting engine trim and tilt. Requires spacer kit H05090. (See Figs. 9a & 9c).
	1998 TO DATE	60HP	HC5345	Steering Hook Yamaha Part no. 63D-48511-00-4D must be installed and Spacer Part no. 996689 must be used. (See Figs. 9a & 9c).
	1990 TO DATE	70-90HP	HC5345	Requires spacer kit H05090.
	2002 TO DATE	25-60HP 4 Stroke	HC5348	See Fig. 9b. Requires spacer kit H05090.
YANMAR	1990 TO DATE	27-36HP	HC5345	Requires Spacer Kit H05090



ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut 3/8" NF Nylok® SS
*2	113225	1	HHCS 3/8UNJFX1.35 HSS (Not Used)
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	Nut 7/16" NF Nylok® SS
5	202027	2	Washer, Flat 1/2" SS
*6	192126	2	Nut 1/2" NF Nylok® ni plt br
7	995876	4	Spacer, Thick, Plastic
8	996689	1	Spacer, Thin, Plastic
9	730229	1	Support Rod

ITEM	PART #	QTY	DESCRIPTION
10	828085	1	Adjusting Nut & Screw SS, Teflon Coated
11	202300	2	Washer, Flat 5/8" SS
12	839120	2	Support Brackets
13	444005	1	Pivot Mount Cylinder
*14	728994	1	Spacer, Medium (Maybe Used)
15	113330	1	HHCS 3/8" NF x 1-3/8" SS
16	H05090		Refer to page 39 for specific spacer installation instructions.

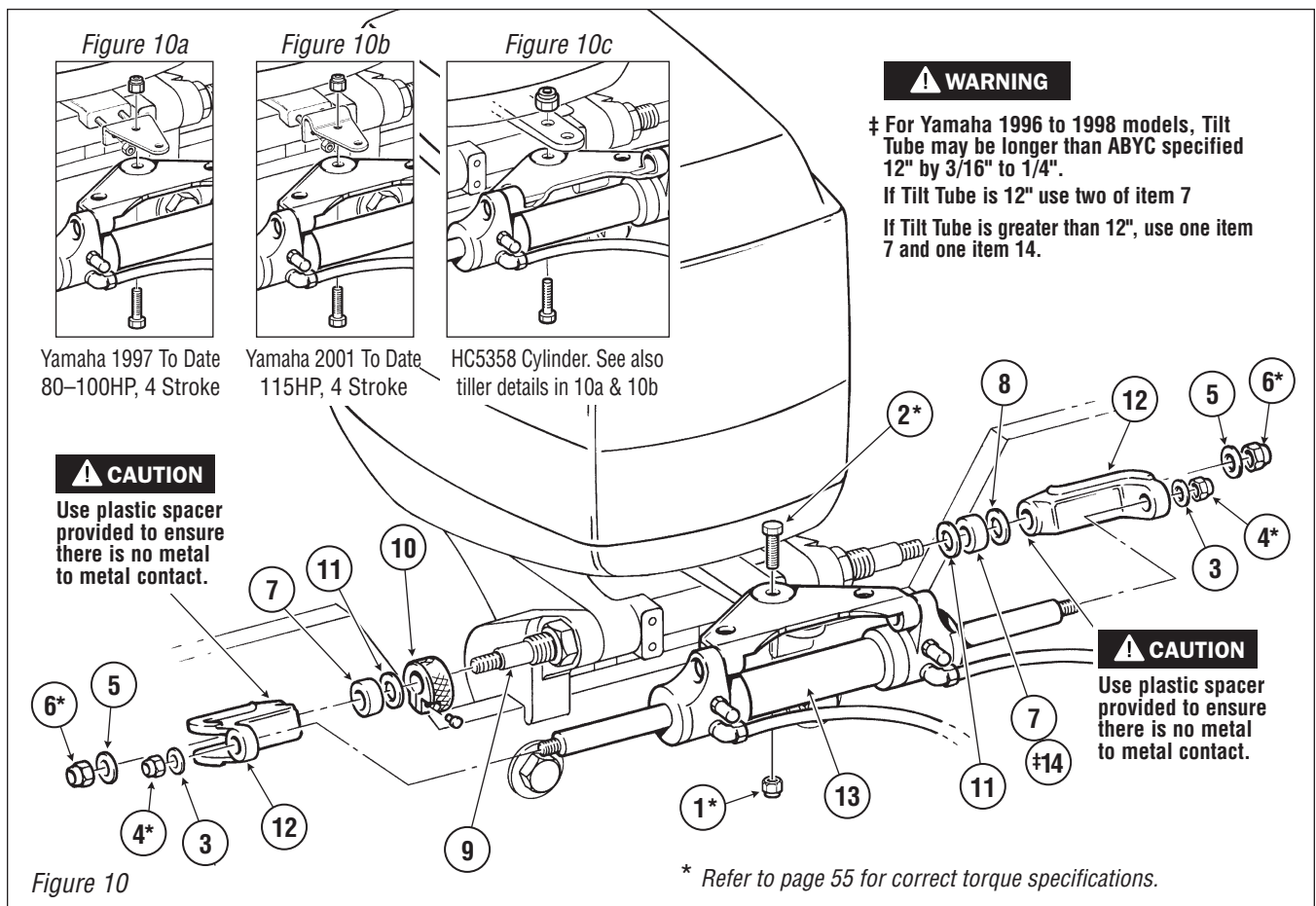
INSTALLATION INSTRUCTIONS

SINGLE ENGINE

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
YAMAHA	1986 TO DATE	100–200 HP (2 Stroke)	HC5345	1997 to Date 80–100HP 4 Stroke (See Fig. 10a) 2001 to Date 115HP 4 Stroke (See Fig. 10b). Optional Cylinder (See Fig. 10c). MUST use high strength tiller bolt, Kit HA5822. Bolt head is marked with TFX ARP. MUST use high strength tiller bolt, Kit HA5822. Bolt head is marked with TFX ARP (See Fig. 10c).
	1990 TO DATE	150–300 HP (2 Stroke)	HC5345	
	1997 TO DATE	75–250 HP (4 Stroke)	HC5345	
	1997 TO DATE	75–250 HP (4 Stroke)	HC5358	
	2007 TO DATE	350 HP	HC5345	
	2007 TO DATE	350 HP *See note below.	HC5358*	

* Interference MAY occur when engine is positioned in lowest mounting hole on transom. HC5345 will allow more space for unrestricted mounting.



ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113225	1	HHCS 3/8UNJFX1.35 HSS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	Nut, 7/16" NF Nylok® SS
5	202027	2	Washer, Flat 1/2" SS
*6	192126	2	Nut 1/2" NF Nylok® ni plt br
7	995876	2	Spacer, Thick
8	996689	1	Spacer, Thin

ITEM	PART #	QTY	DESCRIPTION
9	730229	1	Support Rod
10	828085	1	Adjusting Nut & Screw SS, Teflon Coated
11	202300	2	Washer, Flat 5/8" SS
12	839120	2	Support Brackets
13	828009	1	Pivot Mount Cylinder
*14	728994	1	Spacer, Medium (Some 1996 to 1998)
15	113350	1	HHCS 3/8" NF x 1-1/2" SS

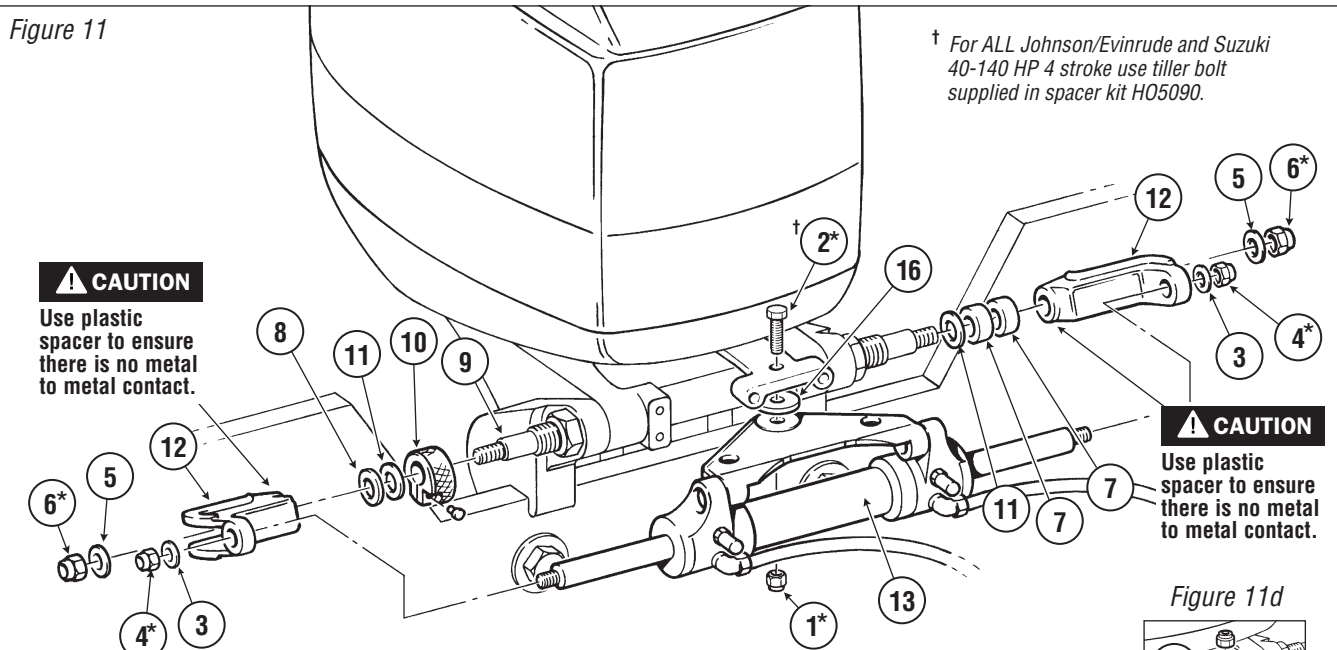
INSTALLATION INSTRUCTIONS

SINGLE ENGINE

⚠ WARNING Refer to on page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
JOHNSON/EVINRUDE	1998 TO DATE	40-140 HP 4 Stroke	HC5358	Requires Spacer Kit HO5090
SUZUKI	1986 TO DATE 1996 ONLY 1987 TO 2002 1990 TO 2000 1998 TO DATE	150-250 HP 115-140 HP 115-140 HP 90-100 HP 40-140 HP 4 Stroke	HC5345 HC5348 HC5345 HC5345 HC5358	May req. Spacer Kit HO5090 (See Fig. 11a & 11b) Requires Spacer Kit HO5090 (See Fig. 11d)

Figure 11

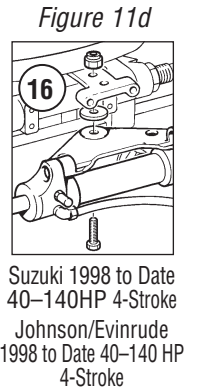
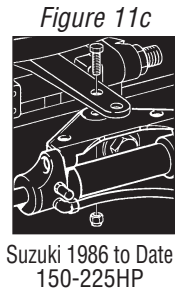
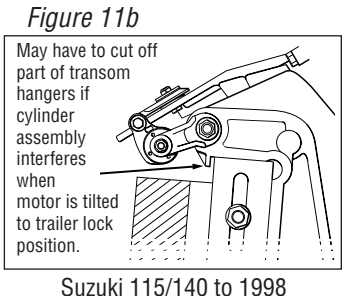
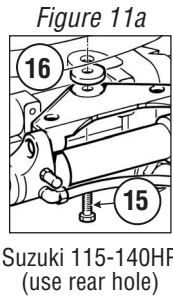


⚠ CAUTION
Use plastic spacer to ensure there is no metal to metal contact.

⚠ CAUTION
Use plastic spacer to ensure there is no metal to metal contact.

⚠ WARNING
Fully tilting the engine may cause the steering cylinder to interfere with the transom and/or splashwell. Possible damage to the steering system can result. Ensure that the cylinder is free from interference at all times.

* Refer to page 55 for correct torque specifications.



ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113225	1	HHCS 3/8UNJFX1.35 HSS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	202027	2	Washer, Flat 1/2" SS
*6	192126	2	Nut 1/2" NF Nylok® ni plt br
7	995876	2	Spacer, Thick, Plastic
8	996689	1	Spacer, Thin, Plastic
9	730229	1	Support Rod

ITEM	PART #	QTY	DESCRIPTION
10	828085	1	Adjusting Nut & Screw SS, Teflon Coated
11	202300	2	Washer, Flat 5/8" SS
12	839120	2	Support Brackets
13	444005	1	Pivot Mount Cylinder
14	728994	1	Spacer, Medium (Not Used)
15	113330	1	HHCS 3/8" NF x 1-3/8" SS
16	HO5090	n/a	Refer to page 39 for specific spacer installation instructions.

For HC5347 Cylinder Installation ONLY

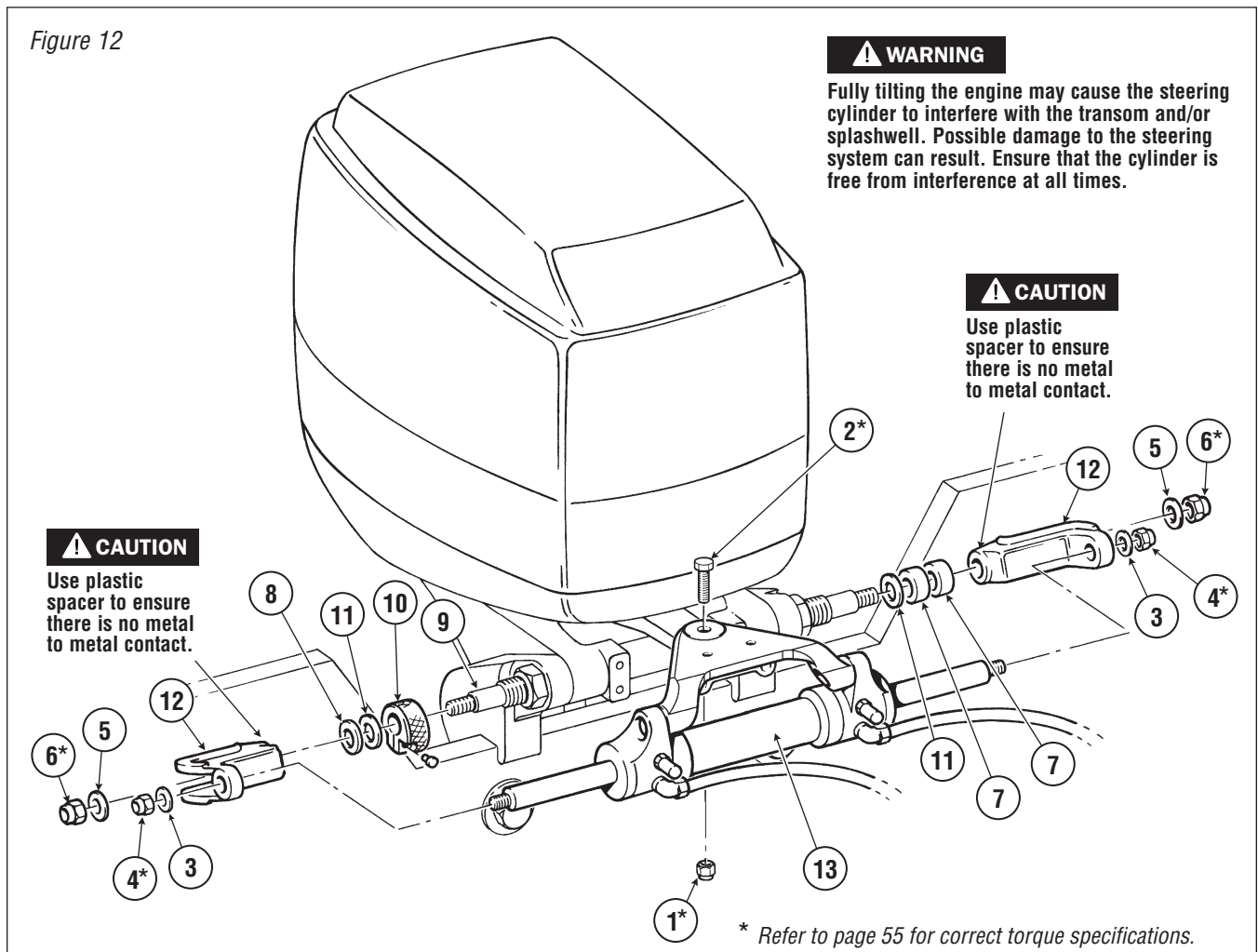
INSTALLATION INSTRUCTIONS

SINGLE ENGINE

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
HONDA	1998 TO DATE	115-130 HP	HC5347	Refer to page 32 for Twin Engine Applications

Figure 12



ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113225	1	HHCS 3/8UNJFX1.35 HSS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	202027	2	Washer, Flat 1/2" SS
*6	192126	2	Nut 1/2" NF Nylok® ni plt br
7	995876	2	Spacer, Thick, Plastic
8	996689	1	Spacer, Thin, Plastic
9	730229	1	Support Rod

ITEM	PART #	QTY	DESCRIPTION
10	828085	1	Adjusting Nut & Screw SS, Teflon Coated
11	202300	2	Washer, Flat 5/8" SS
12	839120	2	Support Brackets
13	828003	1	Pivot Mount Cylinder
14	728994	1	Spacer, Medium (Not Used)
15	113330	1	HHCS 3/8" NF x 1-3/8" SS

INSTALLATION INSTRUCTIONS

SINGLE ENGINE

For **HC5348** Cylinder Installation **ONLY**

⚠ WARNING Refer to on page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
JOHNSON/ EVINRUDE	1977 TO 1990	65-300 HP	HC5348	

Figure 13

⚠ WARNING

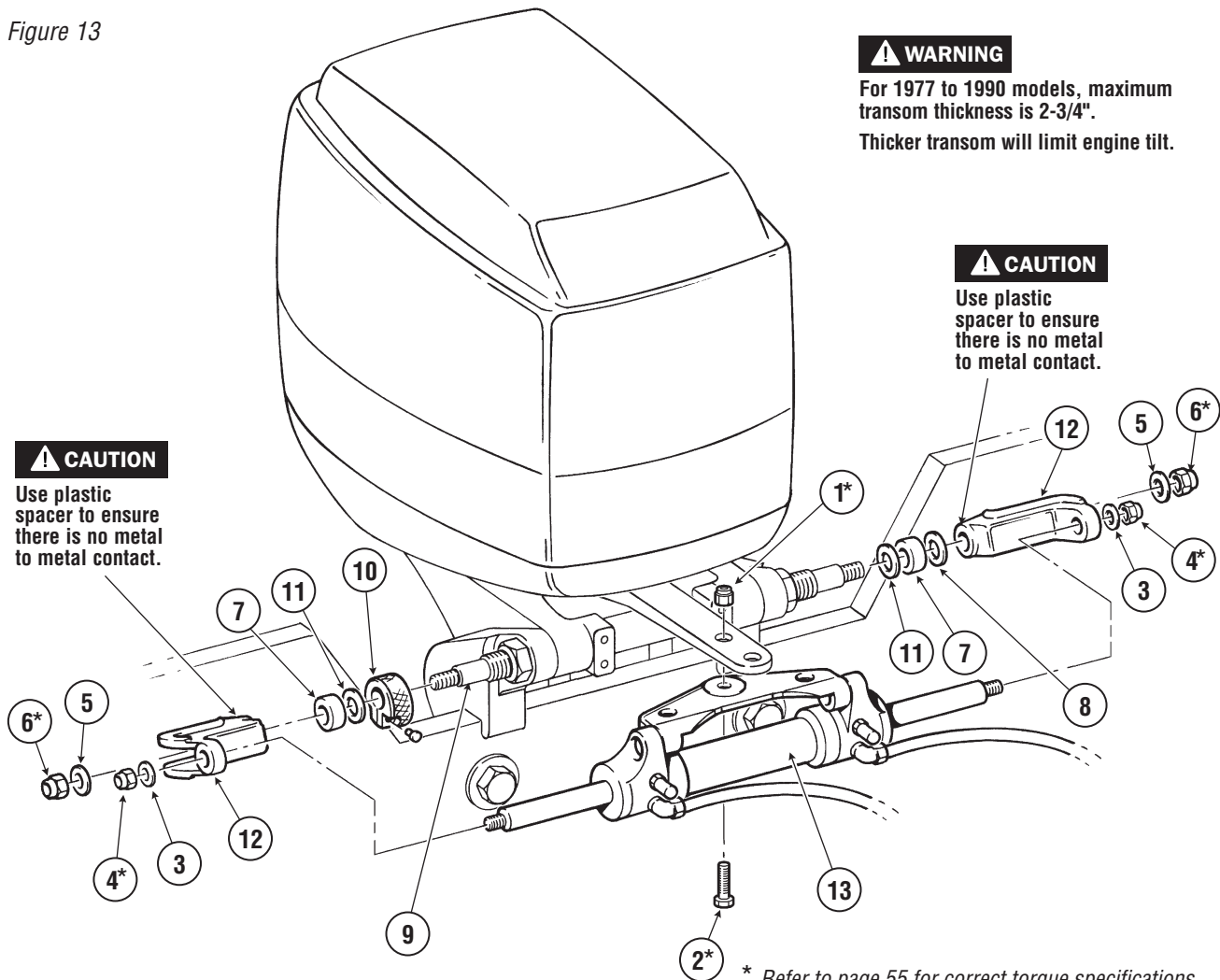
For 1977 to 1990 models, maximum transom thickness is 2-3/4".
Thicker transom will limit engine tilt.

⚠ CAUTION

Use plastic spacer to ensure there is no metal to metal contact.

⚠ CAUTION

Use plastic spacer to ensure there is no metal to metal contact.



* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113225	1	HHCS 3/8UNJFX1.35 HSS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	202027	2	Washer, Flat 1/2" SS
*6	192126	2	Nut 1/2" NF Nylok® ni plt br
7	995876	2	Spacer, Thick
8	996689	1	Spacer, Thin

ITEM	PART #	QTY	DESCRIPTION
9	730229	1	Support Rod
10	828085	1	Adjusting Nut & Screw SS, Teflon Coated
11	202300	2	Washer, Flat 5/8" SS
12	839120	2	Support Brackets
13	828005	1	Pivot Mount Cylinder
14	728994	1	Spacer, Medium (Not Used)
15	113350	1	HHCS 3/8" NF x 1-1/2" SS

New Style Tie Bar Installation

⚠ WARNING

Refer to page 7 of your installation instructions for important warnings and information regarding the correct installation of your SeaStar hydraulic hose.

Cut the threaded end of the tie bar and tube to length using the following formulas below:

⚠ CAUTION The CD dimension must include allowance for engine toe in/out as required, or recommended by the engine manufacturer. Failing to observe toe in/out recommendations may result in harder than normal steering effort.

⚠ WARNING

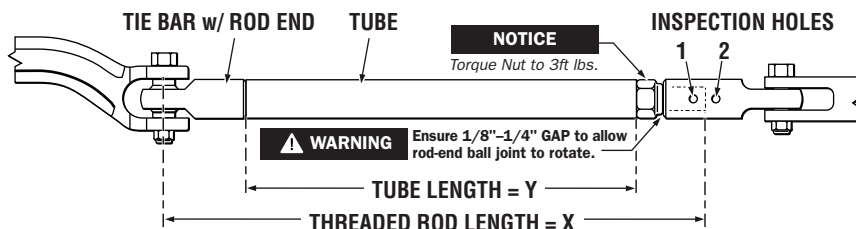
At the time of installation and any other time thereafter, the threaded rod must always fully cover inspection hole 1 of the rod end, but never inspection hole 2. Failing to observe this warning may result in one engine becoming separated from the steering system resulting in property damage and/or personal injury. The SeaStar tie bar is designed for use on Teleflex/SeaStar cylinders only. It may not be compatible with other cylinders.

Note: Maximum standard engine center = 3ft. (0.9m)

HO6001

Note: Engine or tiller centers=CD
 $Y = CD - (\text{subtract}) 18\frac{1}{4}" (375\text{mm})$
 $X = CD - (\text{subtract}) 14\frac{3}{4}" (464\text{mm})$

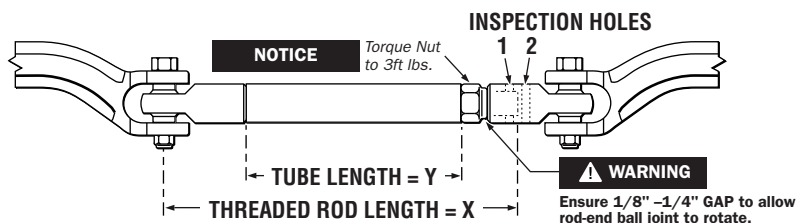
Note: HO6001 Minimum Engine centers = 26" (660mm)



HO6002

$Y = CD - (\text{subtract}) 22\frac{1}{2}" (572\text{mm})$
 $X = CD - (\text{subtract}) 19\frac{1}{4}" (489\text{mm})$

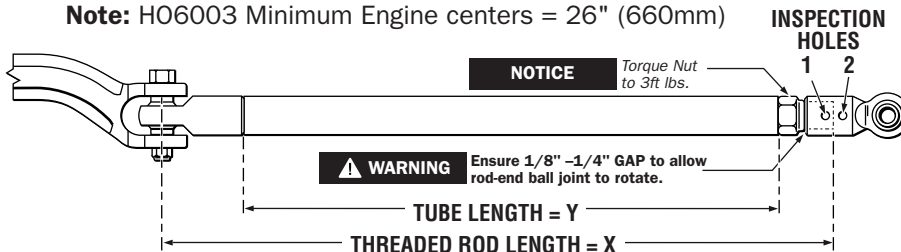
Note: OMC 200-225HP (1991-Date) & OMC FICHT 90-225HP (1996-Date)
 HO6002 Minimum Engine centers = 29" (737mm)
 All other makes and models
 HO6002 Minimum Engine centers = 27" (685mm)



HO6003

$Y = CD - (\text{subtract}) 13\frac{3}{8}" (340\text{mm})$
 $X = CD - (\text{subtract}) 10\frac{1}{8}" (257\text{mm})$

Note: HO6003 Minimum Engine centers = 26" (660mm)



⚠ CAUTION

Ensure that each cylinder (if more than one) is allowed to hit its piston stop. The tie-bar may have to be disconnected. Failure to do so may fail to purge all the air from the system, causing poor performance.

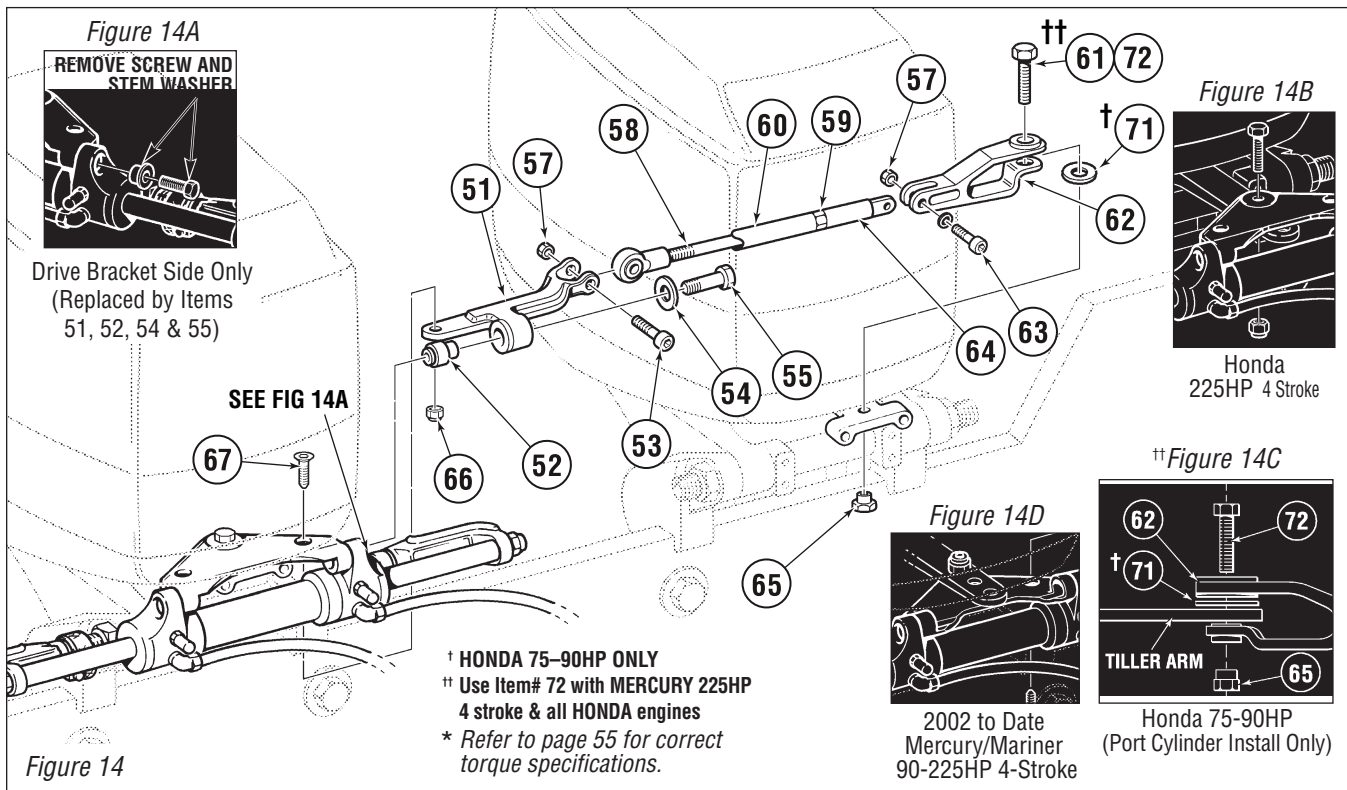
INSTALLATION INSTRUCTIONS

TWIN ENGINES

⚠ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you **MUST** use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

H06001-Single Cylinder tie bar Kit

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL.	DUAL CYL.	
FORCE	1995-TO DATE	90-120 HP	HC5345	H06001	H06002	
HONDA	† 1996-TO DATE	75-90 HP	HC5345	H06001	H06002	Port Cylinder install ONLY. (see Figure 14C) **Requires Spacer Kit H05090. Trim Engine Hooks if Interference occurs
	†† 1998-TO DATE	30-50 HP	HC5345	H06001	H06002	(See Figure 14B)
	†† 2001-TO DATE	225 HP 4 Stroke	HC5345	H06001	H06002	
MERCURY/MARINER	1989-TO DATE	75-275 HP	HC5345	H06001	H06002	(See page 21 for Dual Cylinder)
	†† 2002-TO DATE	90-225 HP 4 Stroke	HC5358	H06001	H06002	(See Figure 14D)
	2002-TO DATE	250 XS HP	HC5345	N/A	N/A	Cylinder req. on every engine (See page 21) MUST use Tournament Cylinders. Must use high strength tiller bolt, Kit HA5822 Bolt head is marked with TFX ARP.



ITEM	PART #	QTY	DESCRIPTION
51	961665	1	Drive Bracket Assembly
52	961686	1	Spacer
*53	186540	1	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	1	Washer 5/16" x 3/4" OD SS
*55	961704	1	HHCS 5/16" NC x 2" SS
*56	113529	1	Nut, Nylok®, 3/8" NF, SS (Not used)
*57	704525	2	Nut, Nylok®, 5/16" NC SS
58	722540	1	Tie Bar c/w Ball Joint
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR
60	722750	1	Stringer Tube, SS
††61	113222	1	HHCS, 3/8" NF 1-1/4", SS

ITEM	PART #	QTY	DESCRIPTION
62	961495	1	Slave Bracket Assembly
*63	186530	1	Shoulder Bolt, 3/8" x 1" SS
64	961685	1	Rod End SS 1/2" NF
65	961193	1	Threaded Bushing
*66	113021	1	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	1	FHSCS, 5/16" NC x 3/4", SS
69	961241	1	Bush, 1/2" OD x 3/8", SS (Not Used)
*70	198767	1	HHCS 3/8" NF x 1-5/8", SS (Not Used)
†71	113600	1	Washer, 3/8" x 1-1/4" OD, SS
††72	116320	1	HHCS, 3/8" NF 1-1/2", SS

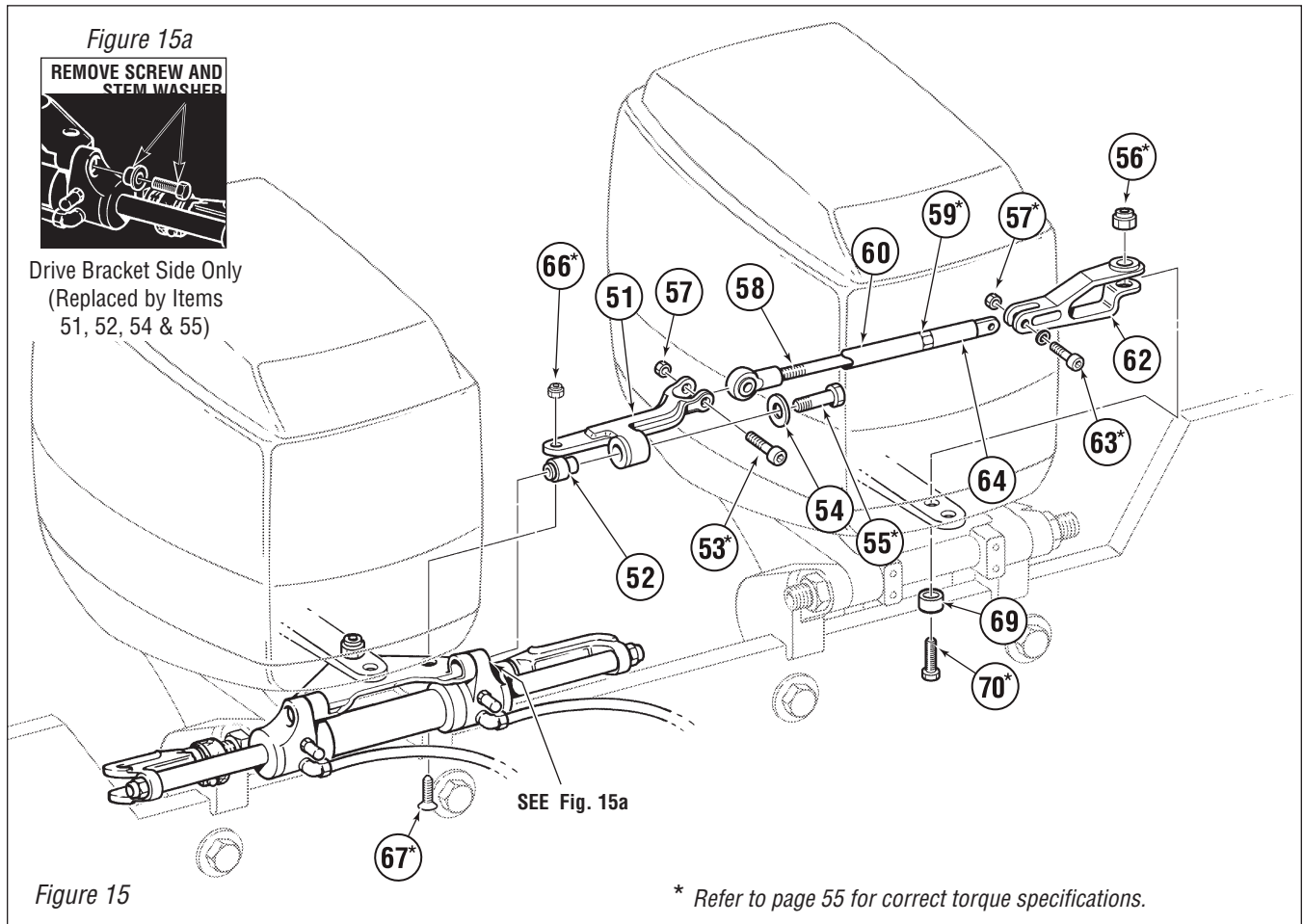
▲ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you MUST use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

H06001-Single Cylinder tie bar Kit

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL.	DUAL CYL.	
YAMAHA	2000 TO DATE	115–250 HP (4 Stroke)	HC5358	H06001	H06002	Must use Tournament Cylinders
	1986 TO DATE	100–200 HP (2 Stroke)	HC5358	H06001	H06002	
	1990 TO DATE	225–300 HP (2 Stroke)	HC5358	H06001	H06002	
	2007 TO DATE	350 HP	N/A	N/A	N/A	



ITEM	PART #	QTY	DESCRIPTION
51	961665	1	Drive Bracket Assembly
52	961686	1	Spacer
*53	186540	1	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	1	Washer 5/16" x 3/4" OD, SS
*55	961704	1	HHCS 5/16" NC x 2-1/2", SS
*56	113529	1	Nut, Nylok®, 3/8" NF, SS
*57	704525	2	Nut, Nylok®, 5/16" NC, SS
58	722540	1	Tie Bar c/w Ball Joint
*59	192126	1	Nut, Nylok®, 1/2" NF, NI PL BR
60	722750	1	Stringer Tube, SS

ITEM	PART #	QTY	DESCRIPTION
*61	113222	1	HHCS, 3/8" NF 1-1/4", SS (Not Used)
62	961495	1	Slave Bracket Assembly
*63	186530	1	Shoulder Bolt, 3/8" x 1", SS
64	961685	1	Rod End SS 1/2" NF
65	961193	1	Threaded Bushing (Not Used)
*66	113021	1	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	1	FHSCS, 5/16" NC x 3/4", SS
69	961241	1	Bush, 1/2" OD x 3/8", SS
*70	198767	1	HHCS 3/8" NF x 1-5/8", SS
71	113600	1	Washer, 3/8" x 1-1/4" OD, SS (Not Used)

INSTALLATION INSTRUCTIONS

TWIN ENGINES

⚠ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you **MUST** use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

H06002-Dual Cylinder tie bar Kit

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL	DUAL CYL	
FORCE	1995 TO DATE	90-120 HP	HC5345	H06001	H06002	
HONDA	1996 TO DATE 2001 TO DATE	75-90 HP 150-225 HP	HC5345 HC5345	H06001 H06001	N/A H06002	See Fig. 16b

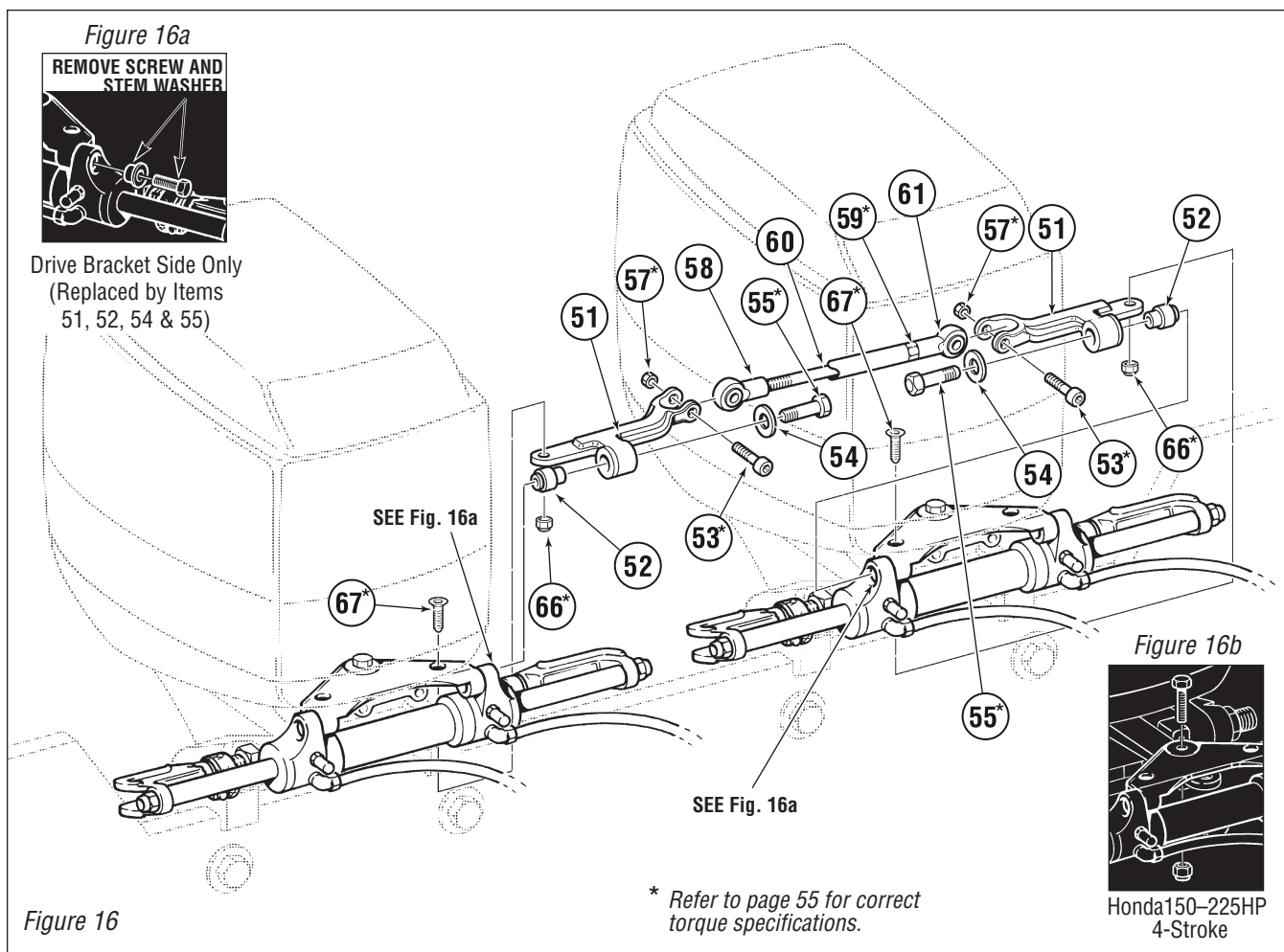


Figure 16

* Refer to page 55 for correct torque specifications.

Honda 150-225HP 4-Stroke

ITEM	PART #	QTY	DESCRIPTION
51	961665	2	Drive Bracket Assembly
52	961686	2	Spacer
*53	186540	2	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	2	Washer 5/16" x 3/4" OD SS
*55	961704	2	HHCS 5/16" NC x 2-1/2" SS
*57	704525	2	Nut, Nylok®, 5/16" NC, SS

ITEM	PART #	QTY	DESCRIPTION
58	722543	1	tie bar c/w Ball Joint
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR
60	722753	1	Stringer Tube, SS
61	116527	1	Rod End Ball 1/2" SS
*66	113021	2	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	2	FHSCS, 5/16" NC x 3/4", SS

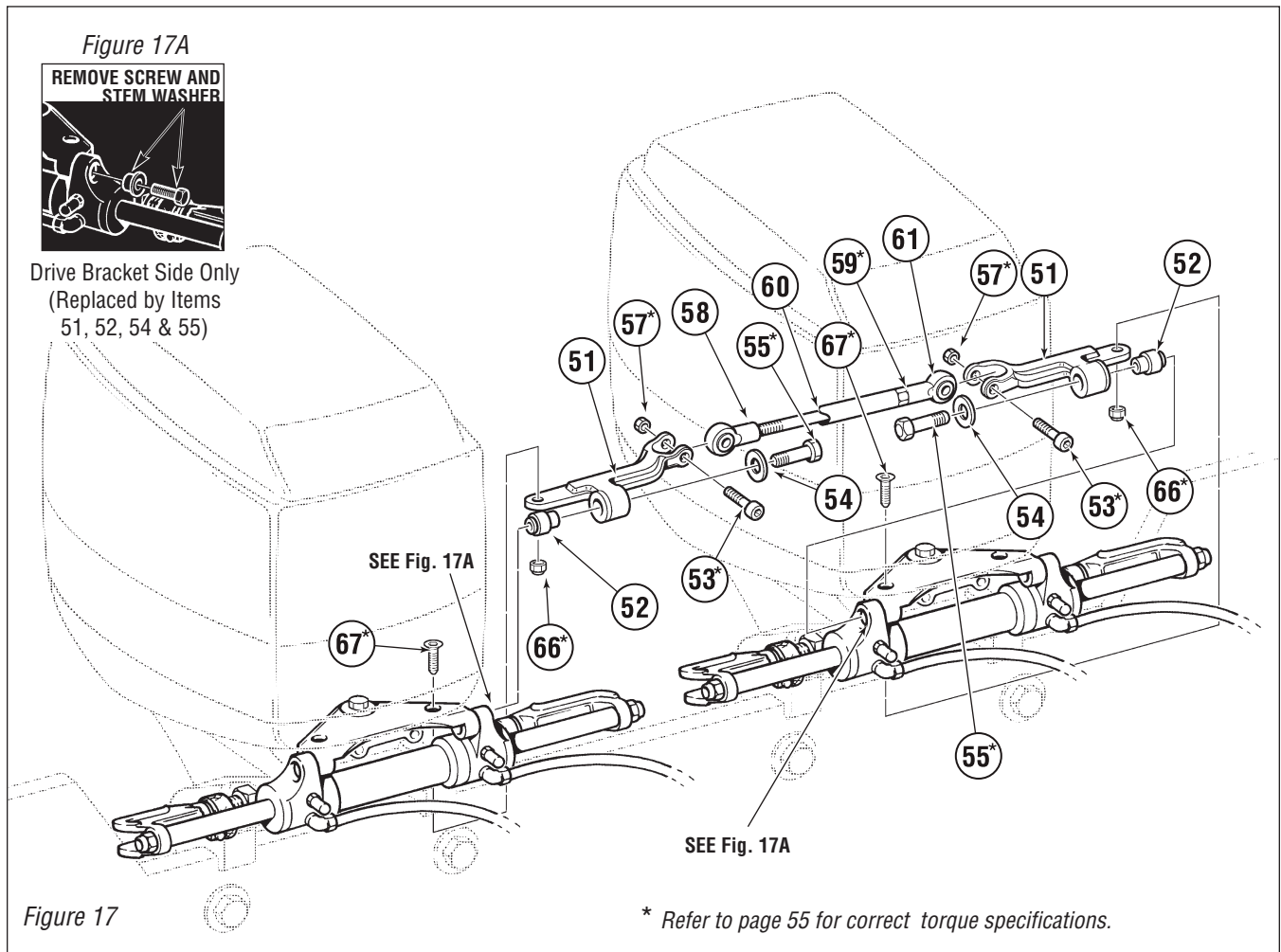
▲ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you MUST use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

H06002-Dual Cylinder tie bar Kit

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL	DUAL CYL	
MERCURY/MARINER	1989 TO DATE	75-275 HP	HC5345	H06001	H06002	(See page 24 for Dual Cylinder) Cylinder required on every engine. MUST use Tournament Cylinders. Must use high strength tiller bolt, Kit HA5822. Bolt Head is marked with TFX ARP.
	2002-TO DATE	225 HP 4 Stroke	HC5358	H06001	H06002	
	2002-TO DATE	250 XS HP	HC5345	N/A	N/A	



ITEM	PART #	QTY	DESCRIPTION
51	961665	2	Drive Bracket Assembly
52	961686	2	Spacer
*53	186540	2	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	2	Washer 5/16" x 3/4" OD SS
*55	961704	2	HHCS 5/16" NC x 2-1/2" SS
*57	704525	2	Nut, Nylok®, 5/16" NC, SS

ITEM	PART #	QTY	DESCRIPTION
58	722543	1	tie bar c/w Ball Joint
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR
60	722753	1	Stringer Tube, SS
61	116527	1	Rod End Ball 1/2" SS
*66	113021	2	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	2	FHSCS, 5/16" NC x 3/4", SS

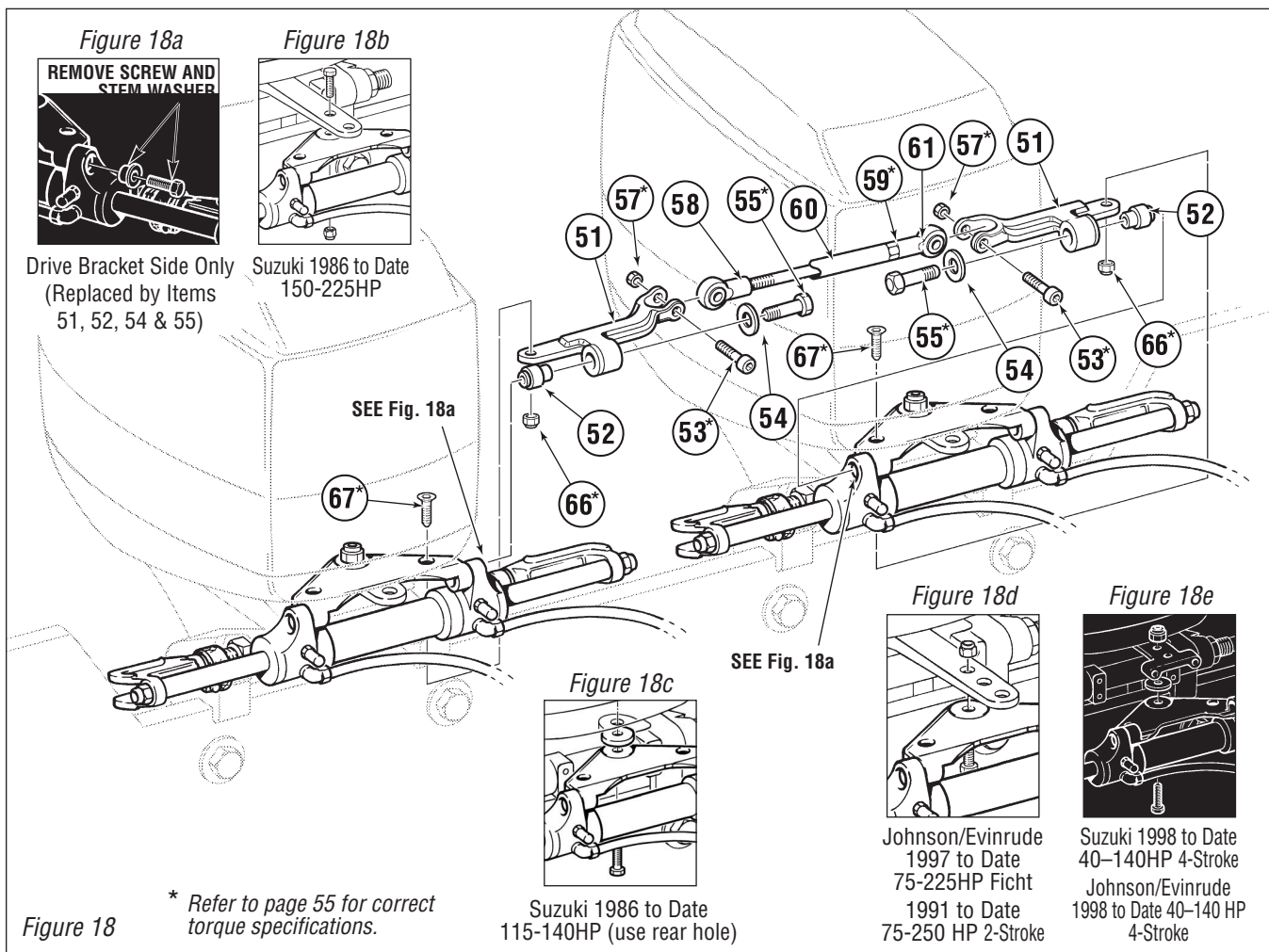
INSTALLATION INSTRUCTIONS

TWIN ENGINES

⚠ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you **MUST** use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

H06002-Dual Cylinder tie bar Kit

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTES
				SINGLE CYL	DUAL CYL	
JOHNSON/EVINRUDE	1991 TO DATE	40-250 HP 2 Stroke	HC5345	H06003	H06002	See Fig. 18d
	1997 TO DATE	75-250 HP FICHT	HC5345	H06003	H06002	See Fig. 18d
	1998 TO DATE	40-140 HP 4 Stroke	HC5358	H06003	H06002	See Fig. 18e Req. Spacer Kit H05090
	2004 TO DATE	75-250 ETech	HC5345	H06003	H06002	See Fig. 18d
SUZUKI	1986 TO DATE	150-225 HP 2 Stroke	HC5345	H06003	H06002	See Fig. 18b
	1986 TO 2002	115-140 HP 2 Stroke	HC5345	H06003	H06002	See Fig. 18c
	1998 TO DATE	40-140 HP 4 Stroke	HC5358	H06003	H06002	Req. 2 x Spacer Kit H05090 Fig. 18e



ITEM	PART #	QTY	DESCRIPTION
51	961665	2	Drive Bracket Assembly
52	961686	2	Spacer
*53	186540	2	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	2	Washer 5/16" x 3/4" OD SS
*55	961704	2	HHCS 5/16" NC x 2-1/2" SS
*57	704525	2	Nut, Nylok®, 5/16" NC, SS

ITEM	PART #	QTY	DESCRIPTION
58	722543	1	tie bar c/w Ball Joint
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR
60	722753	1	Stringer Tube, SS
61	116527	1	Rod End Ball 1/2" SS
*66	113021	2	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	2	FHSCS, 5/16" NC x 3/4", SS

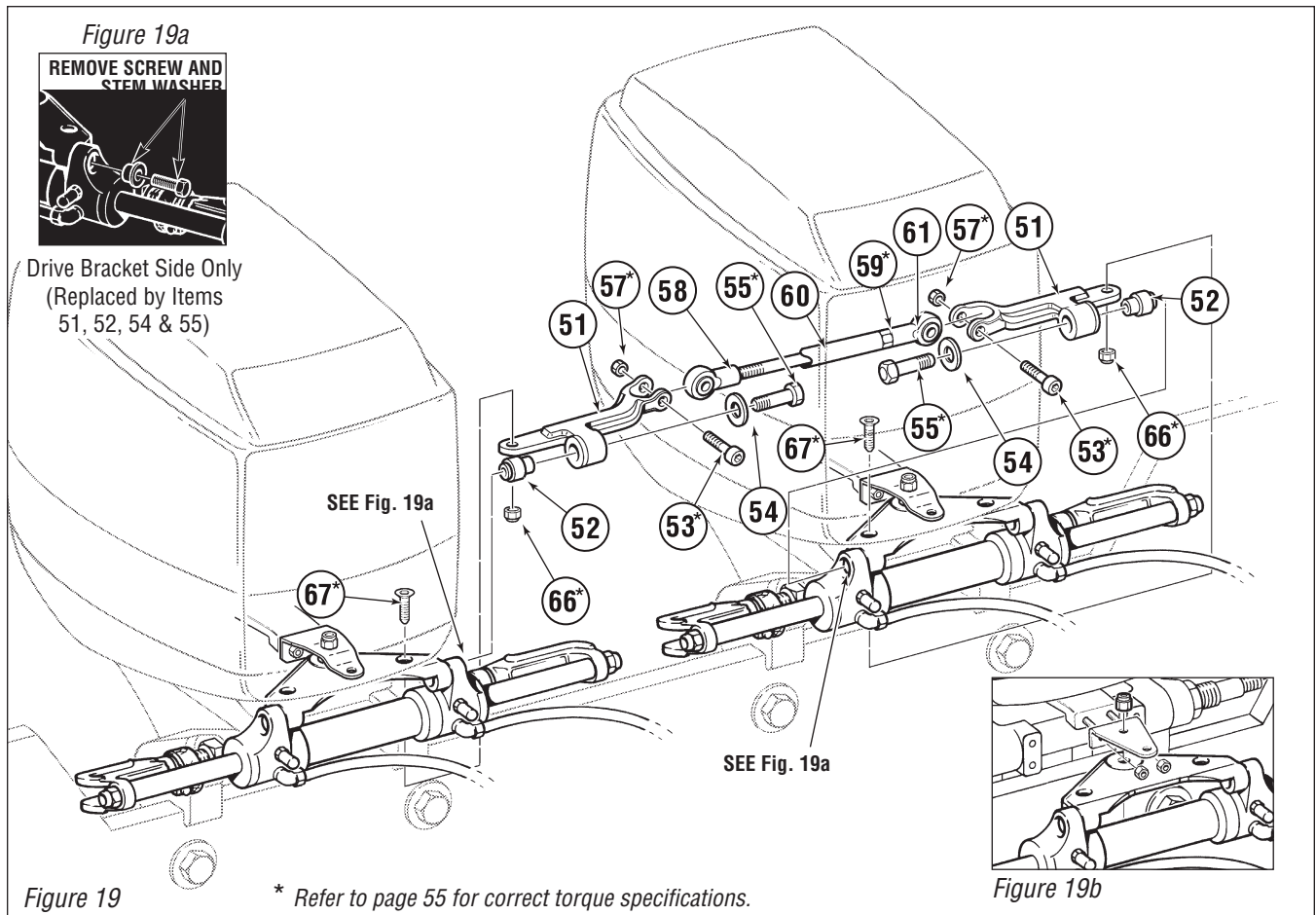
▲ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you MUST use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat.
Refer to page 55 for correct torque specifications of all installation hardware.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

H06002-Dual Cylinder Tiebar Kit

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL.	DUAL CYL.	
YAMAHA	1998 TO DATE	40-50 HP	HC5345	H06001	H06002	Engine clamp brackets must be modified (cut or ground) and the engine through bolted onto transom or interference will occur restricting engine trim and tilt. Requires spacer kit H05090. (See Fig. 19b).
	1998 TO DATE	60 HP	HC5345	H06001	H06002	Steering Hook Yamaha Part no. 63D-48511-00-4D must be installed and Spacer Part no. 996689 must be used. (See Fig. 19b).
	1998 TO DATE	70-90 HP	HC5345	H06001	H06002	Requires spacer kit H05090.



ITEM	PART #	QTY	DESCRIPTION
51	961665	2	Drive Bracket Assembly
52	961686	2	Spacer
*53	186540	2	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	2	Washer 5/16" x 3/4" OD SS
*55	961704	2	HHCS 5/16" NC x 2-1/2" SS
*57	704525	2	Nut, Nylok®, 5/16" NC, SS

ITEM	PART #	QTY	DESCRIPTION
58	722543	1	tie bar c/w Ball Joint
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR
60	722753	1	Stringer Tube, SS
61	116527	1	Rod End Ball 1/2" SS
*66	113021	2	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	2	FHSCS, 5/16" NC x 3/4", SS

INSTALLATION INSTRUCTIONS

TWIN ENGINES

⚠ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you **MUST** use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

H06002-Dual Cylinder Tiebar Kit

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL.	DUAL CYL.	
YAMAHA	1986 TO DATE	115-300 HP (2 Stroke)	HC5358	H06001	H06002	See Fig. 20b Requires spacer kit H05090. Must use Tournament Cylinders.
	1990 TO DATE	225-250 HP	HC5358	H06001	H06002	
	2001 TO DATE	75-250 HP (4 Stroke)	HC5358	H06001	H06002	
	2002 TO DATE	25-60 HP (4 Stroke)	HC5348	H06003	H06002	
	2007 TO DATE	350 HP	N/A	N/A	N/A	
MERCURY/MARINER	2002-TO DATE	225 HP (4 Stroke)	HC5358	H06001	H06002	

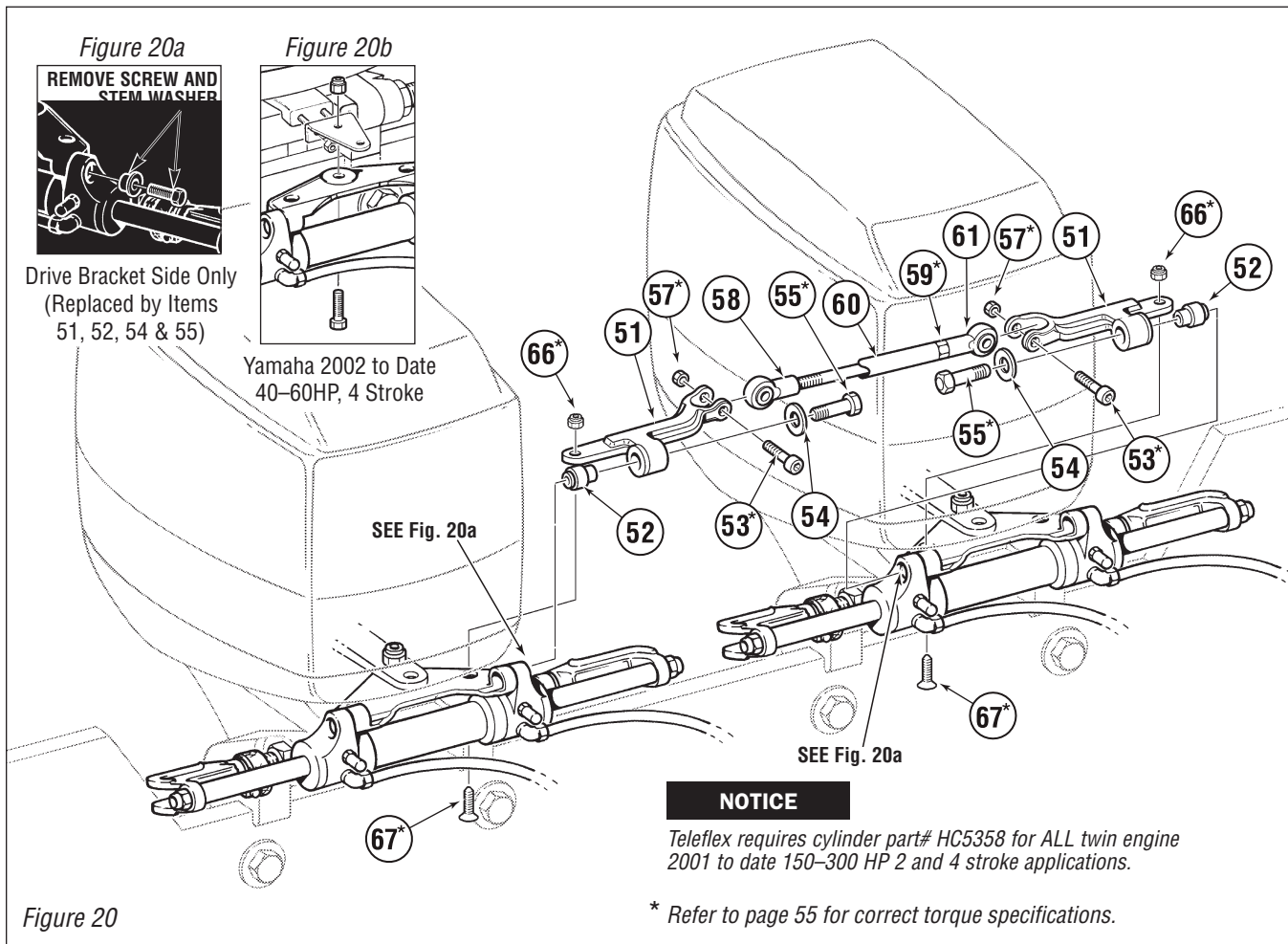


Figure 20

ITEM	PART #	QTY	DESCRIPTION
51	961665	2	Drive Bracket Assembly
52	961686	2	Spacer
*53	186540	2	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	2	Washer 5/16" x 3/4" OD SS
*55	961704	2	HHCS 5/16" NC x 2-1/2" SS
*57	704525	2	Nut, Nylok®, 5/16" NC, SS

ITEM	PART #	QTY	DESCRIPTION
58	722543	1	Tiebar c/w Ball Joint
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR
60	722753	1	Stringer Tube, SS
61	116527	1	Rod End Ball 1/2" SS
*66	113021	2	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	2	FHSCS, 5/16" NC x 3/4", SS

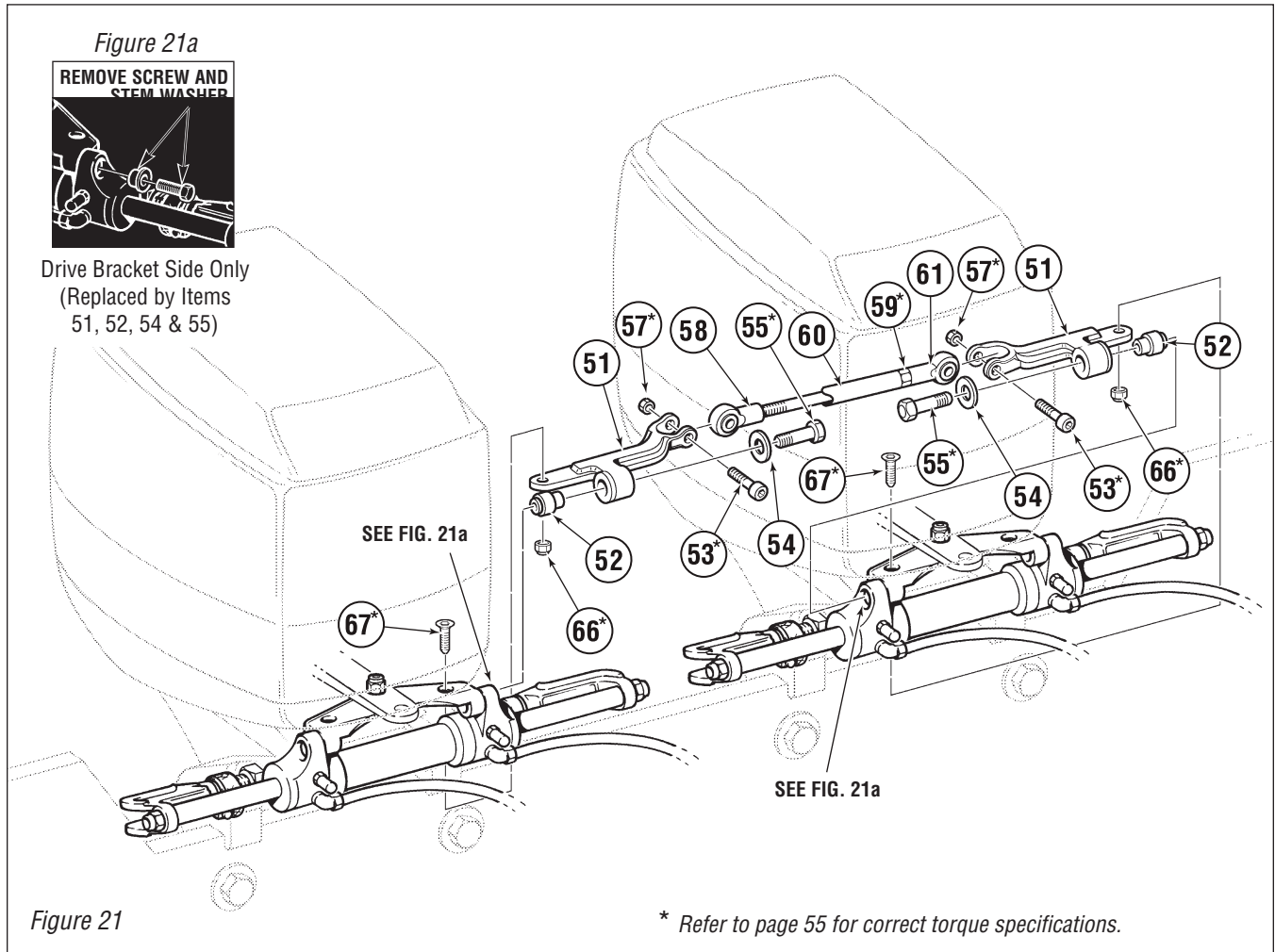
▲ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you MUST use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

H06002-Dual Cylinder Tiebar Kit for HC5348 Cylinder Installation ONLY

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL.	DUAL CYL.	
JOHNSON EVINRUDE	1977 TO 1990	65-300 HP	HC5348	H06001	H06002	



ITEM	PART #	QTY	DESCRIPTION
51	961665	2	Drive Bracket Assembly
52	961686	2	Spacer
*53	186540	2	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	2	Washer 5/16" x 3/4" OD SS
*55	961704	2	HHCS 5/16" NC x 2-1/2" SS
*57	704525	2	Nut, Nylok®, 5/16" NC, SS
58	722543	1	Tiebar c/w Ball Joint
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR

ITEM	PART #	QTY	DESCRIPTION
60	722753	1	Stringer Tube, SS
61	116527	1	Rod End Ball 1/2" SS
*66	113021	2	Nut, Nylok®, 5/16" NC, SS, Thin
*67	960516	2	FHCS, 5/16" NC x 1", SS

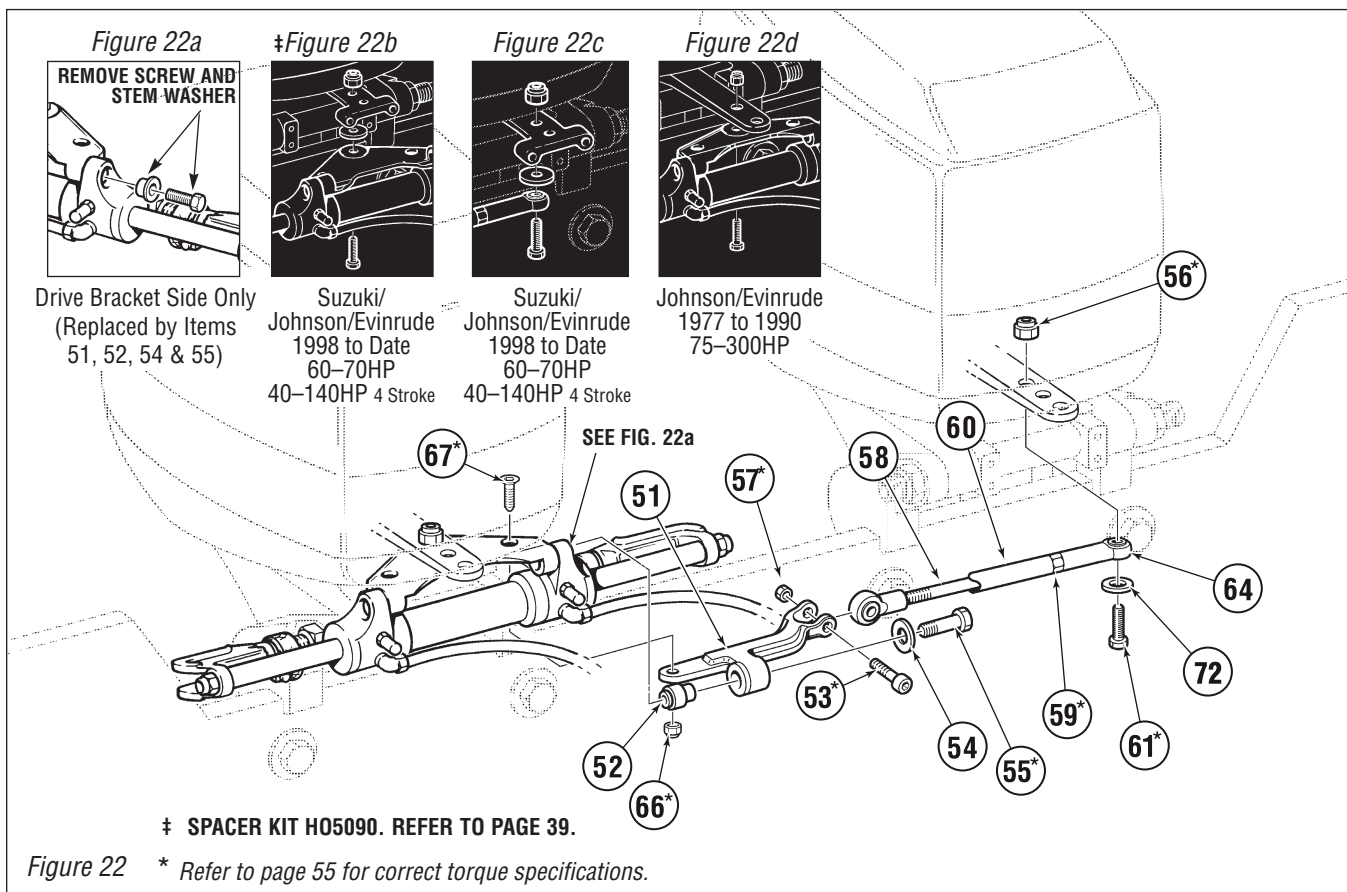
INSTALLATION INSTRUCTIONS

TWIN ENGINES

⚠ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you **MUST** use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

HO6003-Single Cylinder Tiebar Kit, Johnson/Evinrude, Suzuki

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL	DUAL CYL	
JOHNSON/EVINRUDE	1977 TO 1990	65-300 HP	HC5348	HO6003	HO6002	See Fig. 22d Includes ETech
	1991 TO DATE	40-250 HP	HC5345	HO6003	HO6002	
	1996 TO DATE	75-250 HP FIGHT	HC5345	HO6003	HO6002	†Req. 2 x H05090. See Fig. 22b & 22c
	1998 TO DATE	40-140 HP 4 Stroke	HC5358	HO6003	HO6002	
SUZUKI	1986 TO DATE	150-225 HP	HC5345	HO6003	HO6002	†Req. 2 x H05090. See Fig. 22b & 22c
	1998 TO DATE	60-70 HP	HC5345	HO6003	HO6002	
	1998 TO DATE	40-140 HP 4 Stroke	HC5358	HO6003	HO6002	†Req. 2 x H05090. See Fig. 22b & 22c



ITEM	PART #	QTY	DESCRIPTION
51	961665	1	Drive Bracket Assembly
52	961686	1	Spacer
*53	186540	1	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	1	Washer 5/16" Flat 3/4", SS
*55	961704	1	HHCS 5/16" NC x 2-1/2", SS
*56	113529	1	Nut, Nylok®, 3/8" NF, SS
*57	704525	1	Nut, Nylok®, 5/16" NC, SS
58	722545	1	Tie Bar c/w Ball Joint (HO6003)

ITEM	PART #	QTY	DESCRIPTION
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR
60	722755	1	Stringer Tube
*61	116320	1	HHCS, 3/8" NF x 1-1/2", SS
64	116527	1	Rod End SS 1/2" NF
*65	113529	1	Nut, Nylok®, 3/8" NF, SS
*66	113021	1	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	1	FHSCS, 5/16" NC x 3/4", SS
72	113622	1	Washer, 3/8" Dia., SS

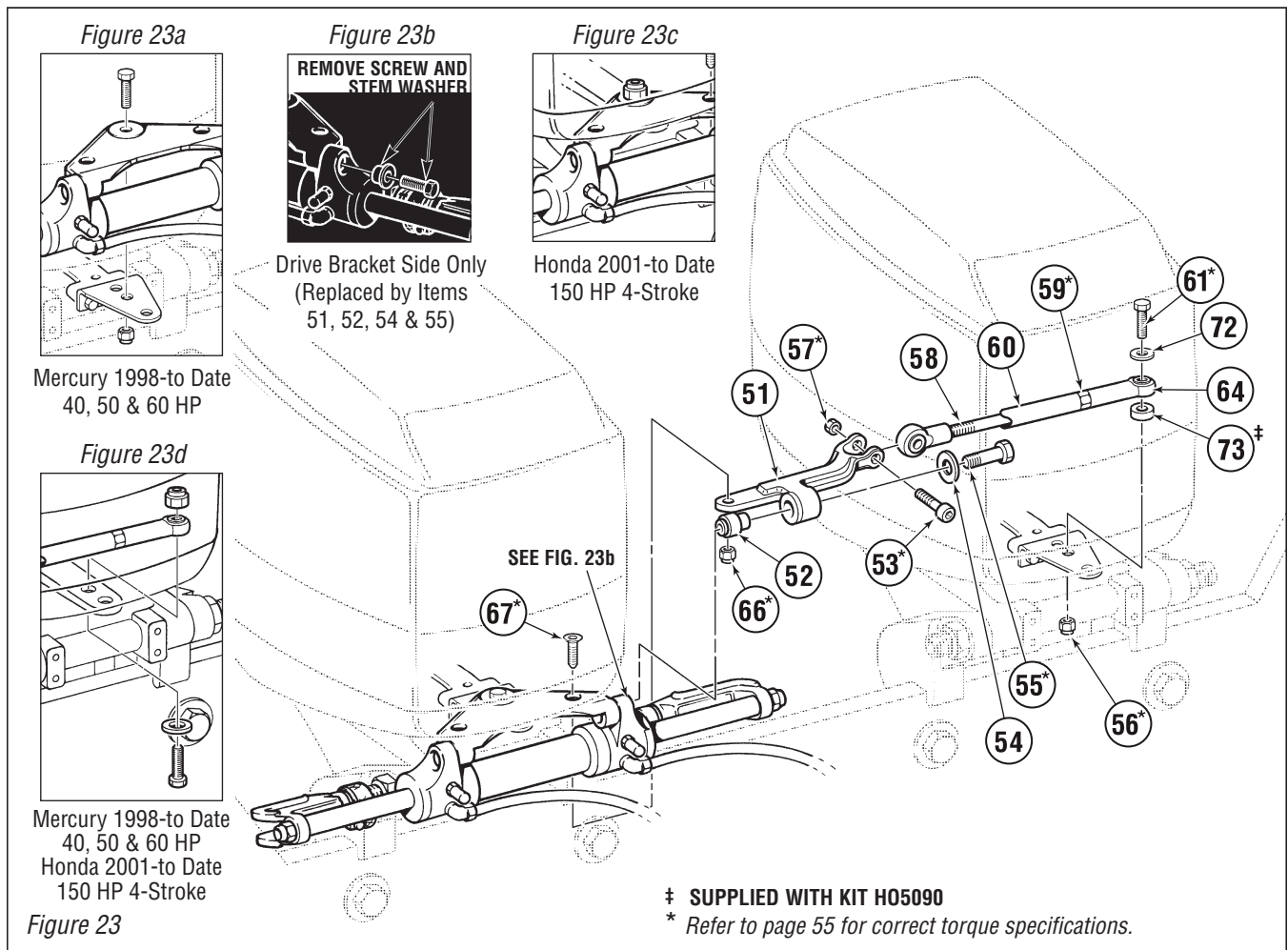
▲ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you MUST use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat.
Refer to page 55 for correct torque specifications of all installation hardware.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

H06003-Single Cylinder Tiebar Kit, Mercury

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYLINDER	DUAL CYLINDER	
MERCURY	1998-TO DATE	40, 50 & 60 HP 2 & 4-STROKE	HC5345	H06003	H06002	Requires Kit H05090
HONDA	2001-TO DATE	150HP 4-STROKE	HC5345	H06003	H06002	See Fig. 23c & 23d



ITEM	PART #	QTY	DESCRIPTION
51	961665	1	Drive Bracket Assembly
52	961686	1	Spacer
*53	186540	1	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	1	Washer 5/16" Flat 3/4", SS
*55	961704	1	HHCS 5/16" NC x 2-1/2", SS
*56	113529	1	Nut, Nylok®, 3/8" NF, SS
*57	704525	1	Nut, Nylok®, 5/16" NC, SS
58	722545	1	Tie Bar c/w Ball Joint (H06003)
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR

ITEM	PART #	QTY	DESCRIPTION
60	722755	1	Stringer Tube
*61	116320	1	HHCS, 3/8" NF x 1-1/2", SS
64	116527	1	Rod End SS 1/2" NF
*65	113529	1	Nut, Nylok®, 3/8" NF, SS
*66	113021	1	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	1	FHSCS, 5/16" NC x 3/4", SS
72	113622	1	Washer, 3/8" Dia., SS
‡73	710921	1	1/8" SS Spacer

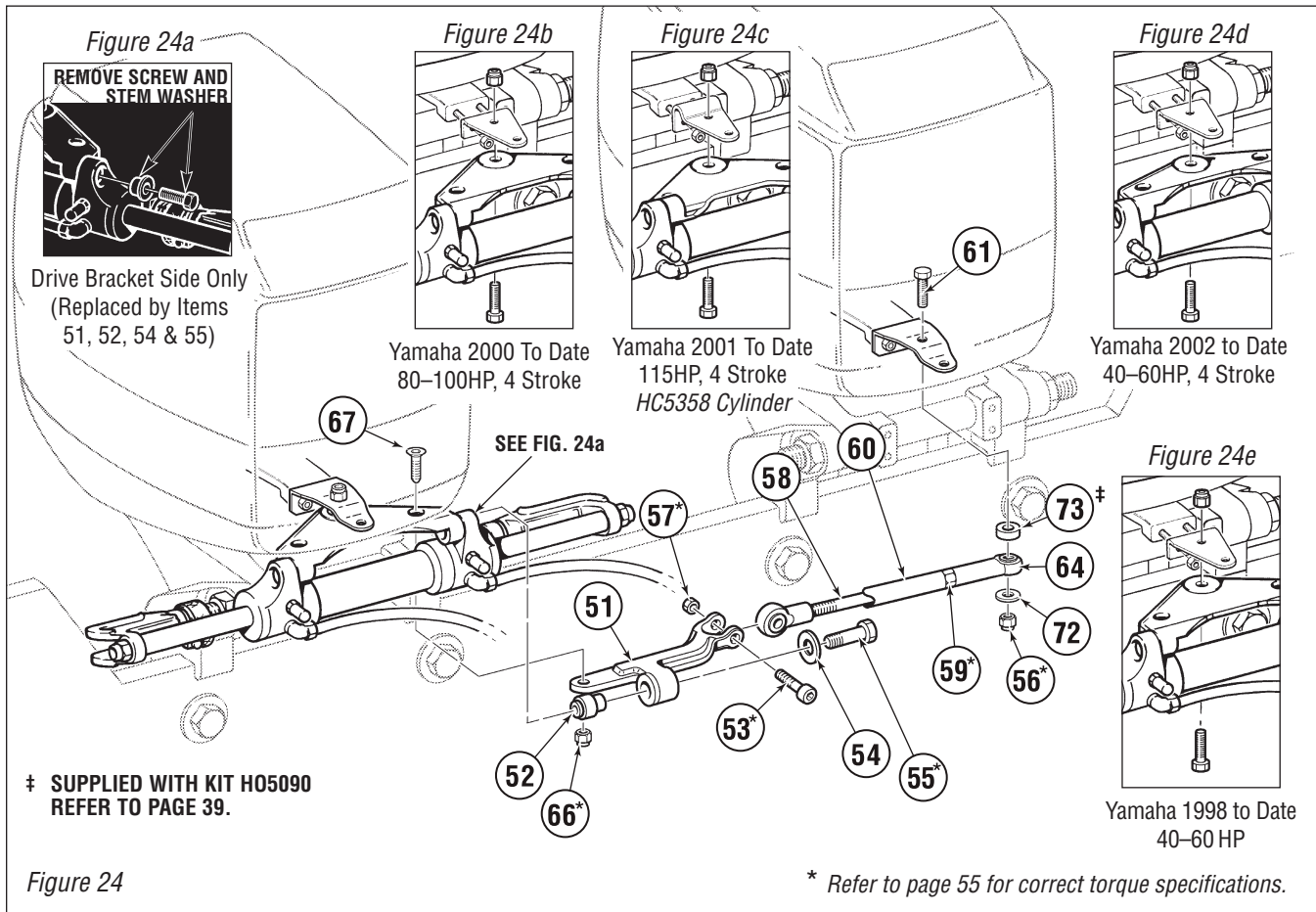
INSTALLATION INSTRUCTIONS

TWIN ENGINES

⚠ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you **MUST** use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

H06003-Single Cylinder Tiebar Kit, Yamaha

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				SINGLE CYL	DUAL CYL	
YAMAHA	1998 TO DATE	40-50 HP	HC5345	H06003	H06002	See Fig. 24e
	1998 TO DATE	60 HP	HC5345	H06003	H06002	Req. 2 x Spacer Kit H05090. See Fig. 24e
	1998 TO DATE	70-90 HP	HC5345	H06003	H06002	Req. 2 x Spacer Kit H05090.
	1998 TO DATE	80-100 HP	HC5345	H06003	H06002	See Fig. 24b
	1998 TO DATE	115 HP 4 Stroke	HC5358	H06003	H06002	See Fig. 24c
	2002 TO DATE	40-60HP 4 Stroke	HC5348	H06003	H06002	Req. 2 x Spacer Kit H05090. See Fig. 24d



ITEM	PART #	QTY	DESCRIPTION
51	961665	1	Drive Bracket Assembly
52	961686	1	Spacer
*53	186540	1	Shoulder Bolt, 3/8" x 1-1/4", SS
54	010924	1	Washer 5/16" Flat 3/4", SS
*55	961704	1	HHCS 5/16" NC x 2-1/2", SS
*56	113529	1	Nut, Nylok®, 3/8" NF, SS
*57	704525	1	Nut, Nylok®, 5/16" NC, SS
58	722545	1	Tie Bar c/w Ball Joint (H06003)
*59	192126	1	Nut, Nylok® 1/2" NF, NI PL BR

ITEM	PART #	QTY	DESCRIPTION
60	722755	1	Stringer Tube
*61	116320	1	HHCS, 3/8" NF x 1-1/2", SS
64	116527	1	Rod End SS 1/2" NF
*65	113529	1	Nut, Nylok®, 3/8" NF, SS
*66	113021	1	Nut, Nylok®, 5/16" NC, SS, Thin
*67	185901	1	FHSCS, 5/16" NC x 3/4", SS
72	113622	1	Washer, 3/8" Dia., SS
†73	710921	1	1/8" SS Spacer
†74	773421	1	Spacer (For use with 90HP only)

Old Style Tie Bar Installation

NOTICE

The OLD style tiebar and extension plates shown in the following pages are not intended for use in a performance orientated boat. The date ranges shown in the following pages are known proper applications, Teleflex Marine is not updating these plates to fit onto any newer engine. It is suggested that new steering equipment on the outboards be purchased for ALL new engines, or, any engine not noted in the following pages.

Cut the tie bar and tie bar tube to length using the following formula.

$$X = CD - (\text{subtract}) 1" (25\text{mm})$$

$$Y = CD - (\text{subtract}) 4" (101\text{mm})$$

CAUTION

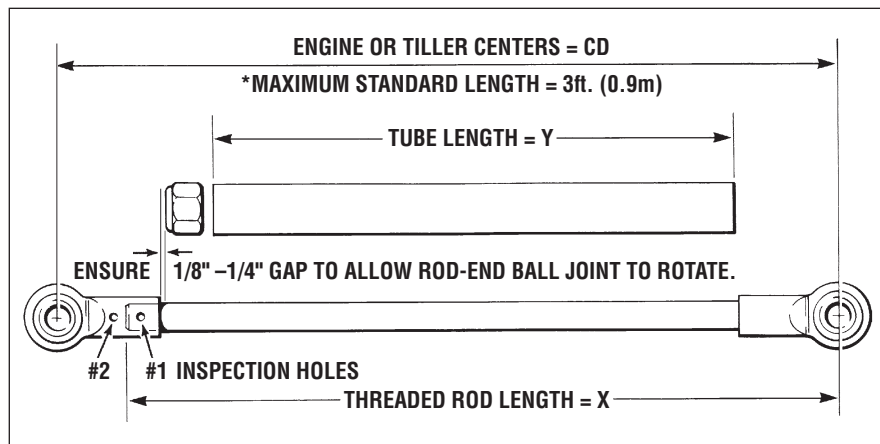
The CD dimension must include allowance for engine toe in/out as required, or recommended by the engine manufacturer. Failing to observe toe in/out recommendations may result in harder than normal steering effort.

WARNING

At the time of installation and any other time thereafter, the threaded rod must always fully cover inspection hole 1, but never inspection hole 2. Failing to observe this warning may result in one engine becoming separated from the steering system causing result in property damage and/or personal injury. The SeaStar tie bar is designed for use on Teleflex/SeaStar cylinders only. It may not be compatible with other cylinders.

WARNING

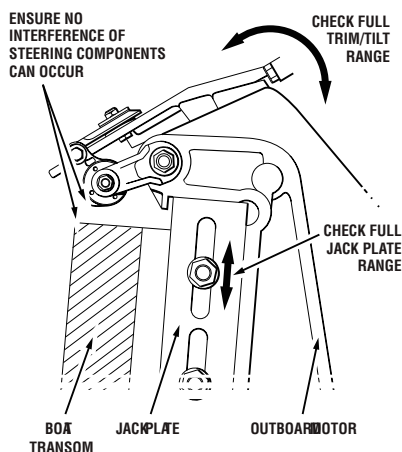
IF AUTOPURGE SYSTEM IS USED TO FILL AND PURGE THE STEERING SYSTEM, DO NOT CONNECT THE TIE BAR UNTIL THE PURGE TANK HAS BEEN DISCONNECTED FROM CYLINDER.



Cylinder Installation Warning

WARNING

Operational interference of the steering cylinder/cylinder fittings and jackplates/transom/splashwell can occur under certain conditions. Check installation thoroughly throughout the full range of Motor Tilt, Jack Height and Trim before making final installation.



If interference does occur, contact: **Teleflex Canada** for additional information/options.

Telephone: **(604) 270-6899** or **(941) 488-6744**

If interference is not eliminated total steering loss can occur, causing property damage and/or personal injury.

INSTALLATION INSTRUCTIONS

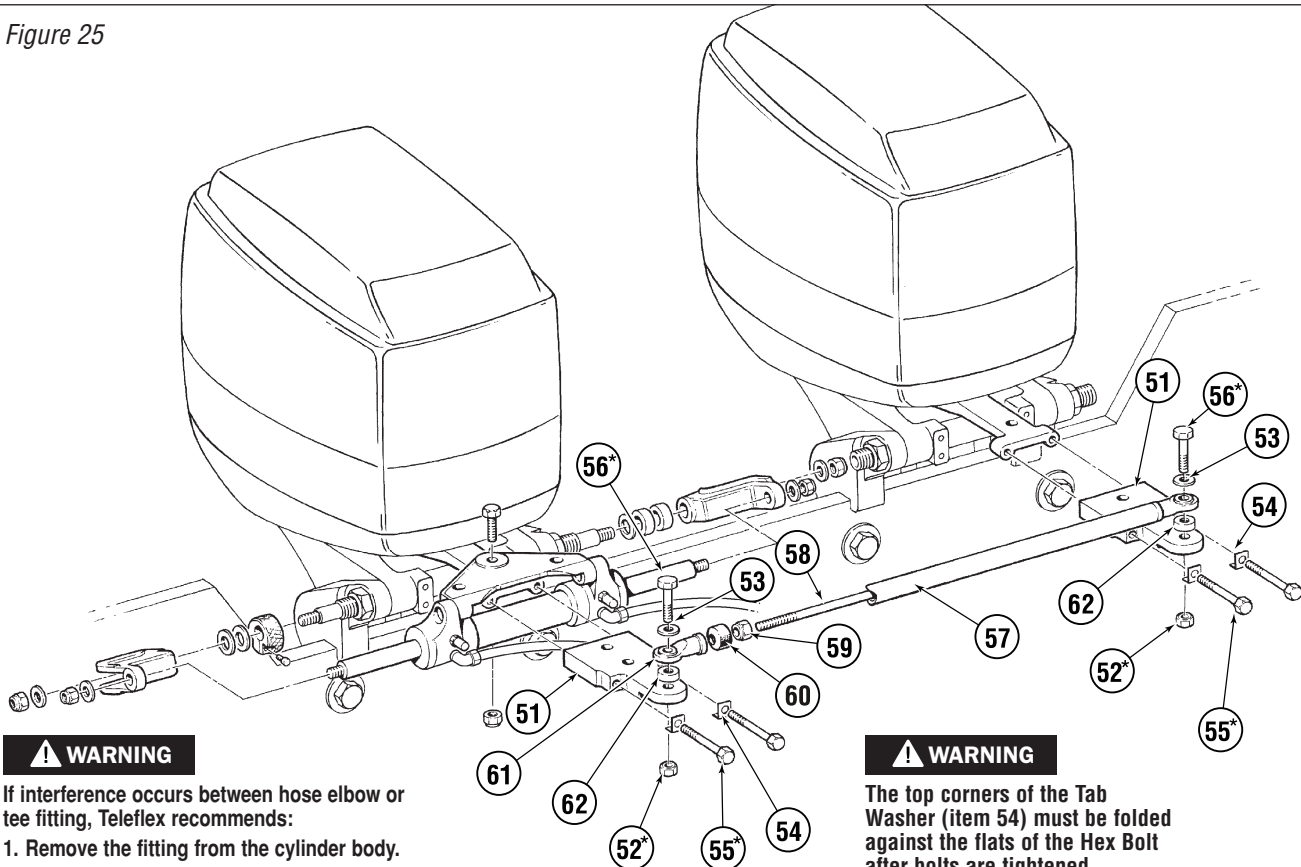
TWIN ENGINES

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

NOTICE Teleflex Marine is no longer manufacturing engine extension plates for any engine built after 2004. Please see pages 18-28 for cylinder and tiebar part numbers.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE ADAPTER PLATES			NOTES
				SINGLE	TWIN c/w tie-rod	TWIN w/o tie rod	
FORCE	1995 TO 2004	90-120 HP	HC5345	NOT REQ.	H05008A	HO5038A	
MERCURY/MARINER	1989 TO 2004	75-275 HP	HC5345	NOT REQ.	H05008A	HO5038A	

Figure 25



WARNING

If interference occurs between hose elbow or tee fitting, Teleflex recommends:

1. Remove the fitting from the cylinder body.
2. Clean threads of fitting and re-apply Loctite® with PST. Thread the fitting back into the port and refer to page 55 for correct torque specifications. Adjust fitting to desired angle.

If interference re-occurs please contact Teleflex (ref. rear cover for contact info.).

WARNING

The top corners of the Tab Washer (item 54) must be folded against the flats of the Hex Bolt after bolts are tightened.

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
51	741127	2	Extension Plate
*52	113529	2	Nut 3/8" NF Nylok®
53	113622	2	Washer 3/8" dia.
54	203123	4	Locking Tab Washer
*55	752021	4	Screw 5/16" x 3-1/2" HHCS
*56	726826	2	Screw 3/8" NF x 1-3/8" HHCS

ITEM	PART #	QTY	DESCRIPTION
57	722721	1	Stringer Tube
58	722523	1	Threaded Rod c/w Ball Joint
59	192126	1	Nut 1/2" NF Nylok®
60	746123	1	Obsolete—No longer required
61	116527	1	Ball Joint
62	710921	2	Spacer

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

NOTICE Teleflex Marine is no longer manufacturing engine extension plates for any engine built after 2004. Please see pages 18-28 for cylinder and tiebar part numbers.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	SINGLE	ENGINE ADAPTER PLATES		NOTES
					TWIN c/w tie-rod	TWIN w/o tie rod	
HONDA	1996 TO 2004	75-90 HP	HC5345	NOT REQ.	H05044A & H05009	H05044A	Single Cylinder Application ONLY Dual Cylinder Use HC5342
	2002 TO 2004	130 HP	HC5345	NOT REQ.	N/A	N/A	

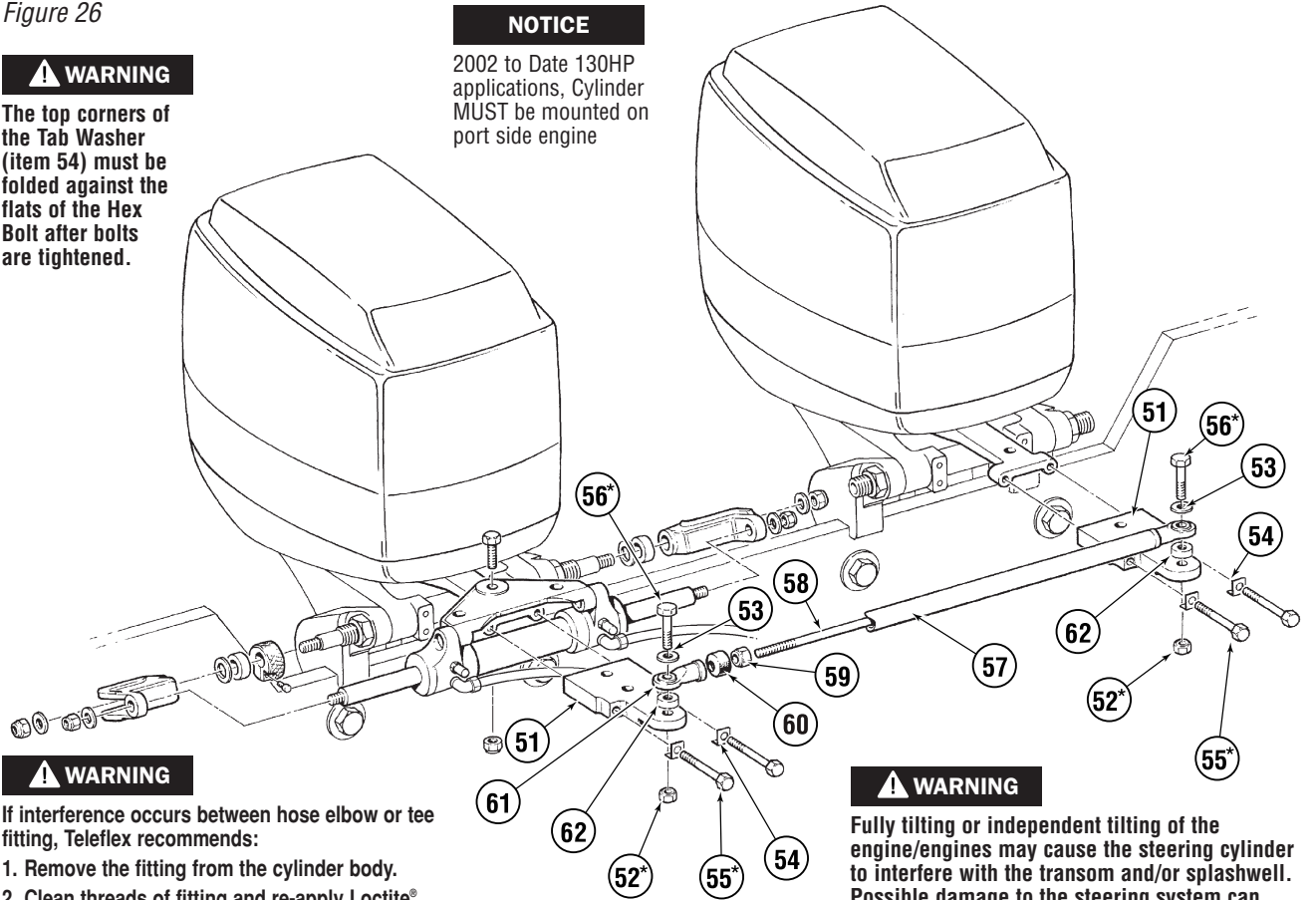
Figure 26

WARNING

The top corners of the Tab Washer (item 54) must be folded against the flats of the Hex Bolt after bolts are tightened.

NOTICE

2002 to Date 130HP applications, Cylinder MUST be mounted on port side engine



WARNING

If interference occurs between hose elbow or tee fitting, Teleflex recommends:

1. Remove the fitting from the cylinder body.
2. Clean threads of fitting and re-apply Loctite® with PST. Thread the fitting back into the port and refer to page 55 for correct torque specifications. Adjust fitting to desired angle.

If interference re-occurs please contact Teleflex (ref. rear cover for contact info.).

WARNING

Fully tilting or independent tilting of the engine/engines may cause the steering cylinder to interfere with the transom and/or splashwell. Possible damage to the steering system can result. Ensure that the cylinder is free from interference at all times. Maximum Transom thickness 2-3/4"

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
51	687723	2	Extension Plate
*52	113529	2	Nut 3/8" NF Nylok®
53	113622	2	Washer 3/8" dia.
54	823673	4	Locking Tab Washer
*55	752927	4	Screw M10 x 1-1/4" x 90 HHCS
*56	726825	2	Screw 3/8" NF x 1-3/4" HHCS

ITEM	PART #	QTY	DESCRIPTION
57	722721	1	Stringer Tube
58	722523	1	Threaded Rod c/w Ball Joint
59	192126	1	Nut 1/2" NF Nylok®
60	746123	1	Obsolete—No longer required
61	116527	1	Ball Joint
62	710921	2	Spacer

INSTALLATION INSTRUCTIONS

TWIN ENGINES

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

NOTICE Teleflex Marine is no longer manufacturing engine extension plates for any engine built after 2004. Please see pages 18-28 for cylinder and tiebar part numbers.

For HC5347 Cylinder Installation **ONLY**

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE ADAPTER PLATES			NOTES
				SINGLE	TWIN c/w tie-rod	TWIN w/o tie rod	
HONDA	1998 TO 2004	115-130 HP	HC5347	NOT REQ.	HO5063	HO5064	

Figure 27

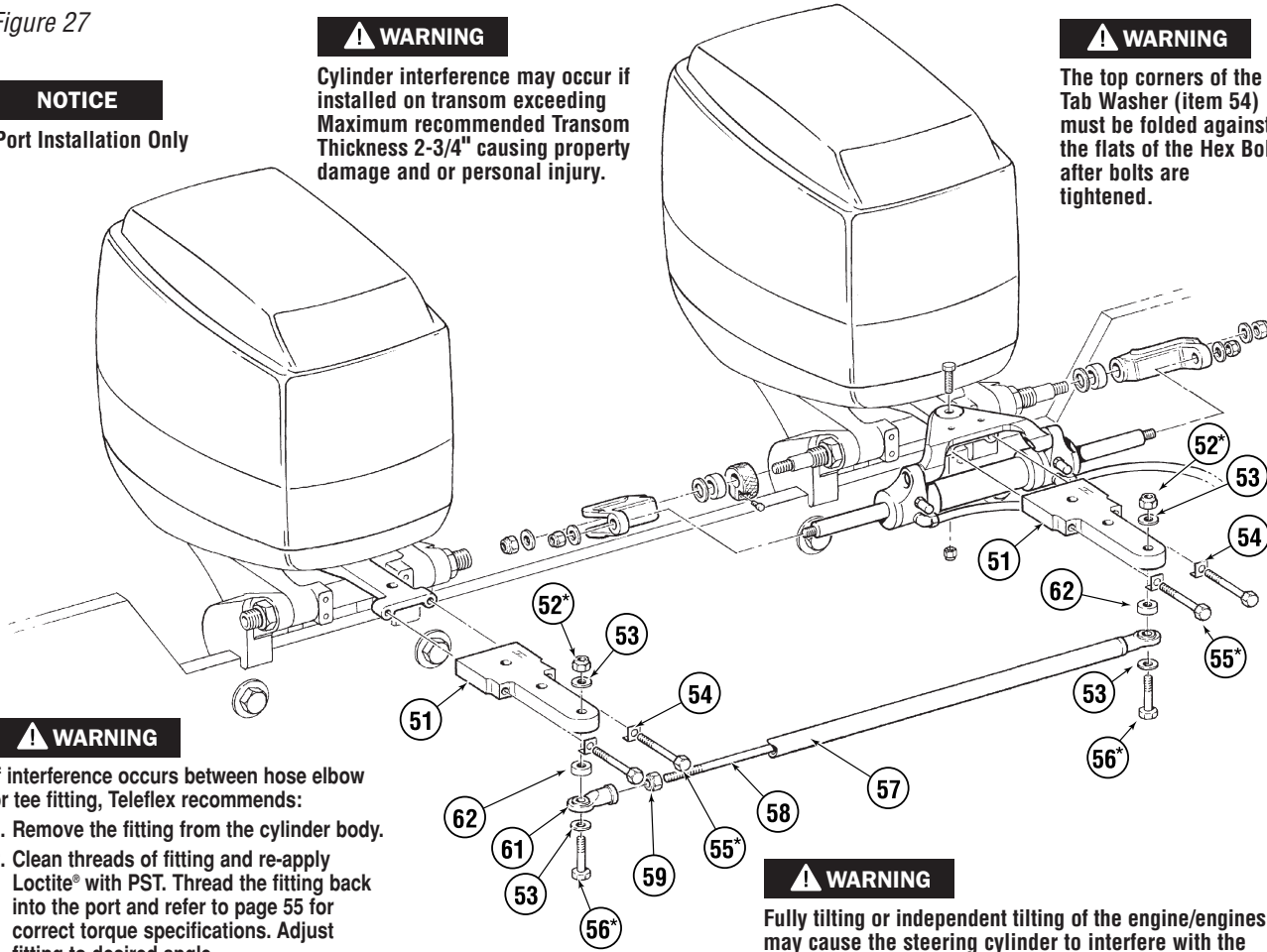
NOTICE
Port Installation Only

WARNING

Cylinder interference may occur if installed on transom exceeding Maximum recommended Transom Thickness 2-3/4" causing property damage and or personal injury.

WARNING

The top corners of the Tab Washer (item 54) must be folded against the flats of the Hex Bolt after bolts are tightened.



WARNING

If interference occurs between hose elbow or tee fitting, Teleflex recommends:
 1. Remove the fitting from the cylinder body.
 2. Clean threads of fitting and re-apply Loctite® with PST. Thread the fitting back into the port and refer to page 55 for correct torque specifications. Adjust fitting to desired angle.
 If interference re-occurs please contact Teleflex (ref. rear cover for contact info.).

WARNING

Fully tilting or independent tilting of the engine/engines may cause the steering cylinder to interfere with the transom and/or splashwell. Possible damage to the steering system can result. Ensure that the cylinder is free from interference at all times. Maximum Transom thickness 2-3/4"

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
51	688725	2	Extension Plate
*52	113529	2	Nut 3/8" NF Nylok®
53	113622	4	Washer 3/8" dia.
54	823673	4	Locking Tab Washer
*55	752930	4	Screw M10 x 1.25 x 62mm HHCS
*56	688726	2	Screw 3/8" NF x 2-1/4" HHCS, SS
57	722721	1	Stringer Tube

ITEM	PART #	QTY	DESCRIPTION
58	722523	1	Threaded Rod c/w Ball Joint
59	192126	1	Nut 1/2" NF Nylok®
61	116527	2	Ball Joint
62	710921	2	Spacer

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

NOTICE Teleflex Marine is no longer manufacturing engine extension plates for any engine built after 2004. Please see pages 18-28 for cylinder and tiebar part numbers.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	SINGLE	ENGINE ADAPTER PLATES	
					TWIN c/w tie-rod	TWIN w/o tie rod
JOHNSON/EVINRUDE	1991 TO 2004	90-175 HP	HC5345	NOT REQ.	H05071A	H05072A
	1991 TO 1992	250 HP	HC5345	NOT REQ.	H05001A	H05030A
	1993 TO 2004	250 HP	HC5345	NOT REQ.	H05073A & H05009	H05073A
	1991 TO 2004	300 HP	HC5345	NOT REQ.	H05001A	H05030A
	1991 TO 2004	200-225 HP	See page 34			
	1997 TO 2004	75-175 HP FIGHT	See page 34			
	1977 TO 1990	90-300 HP	See page 34			

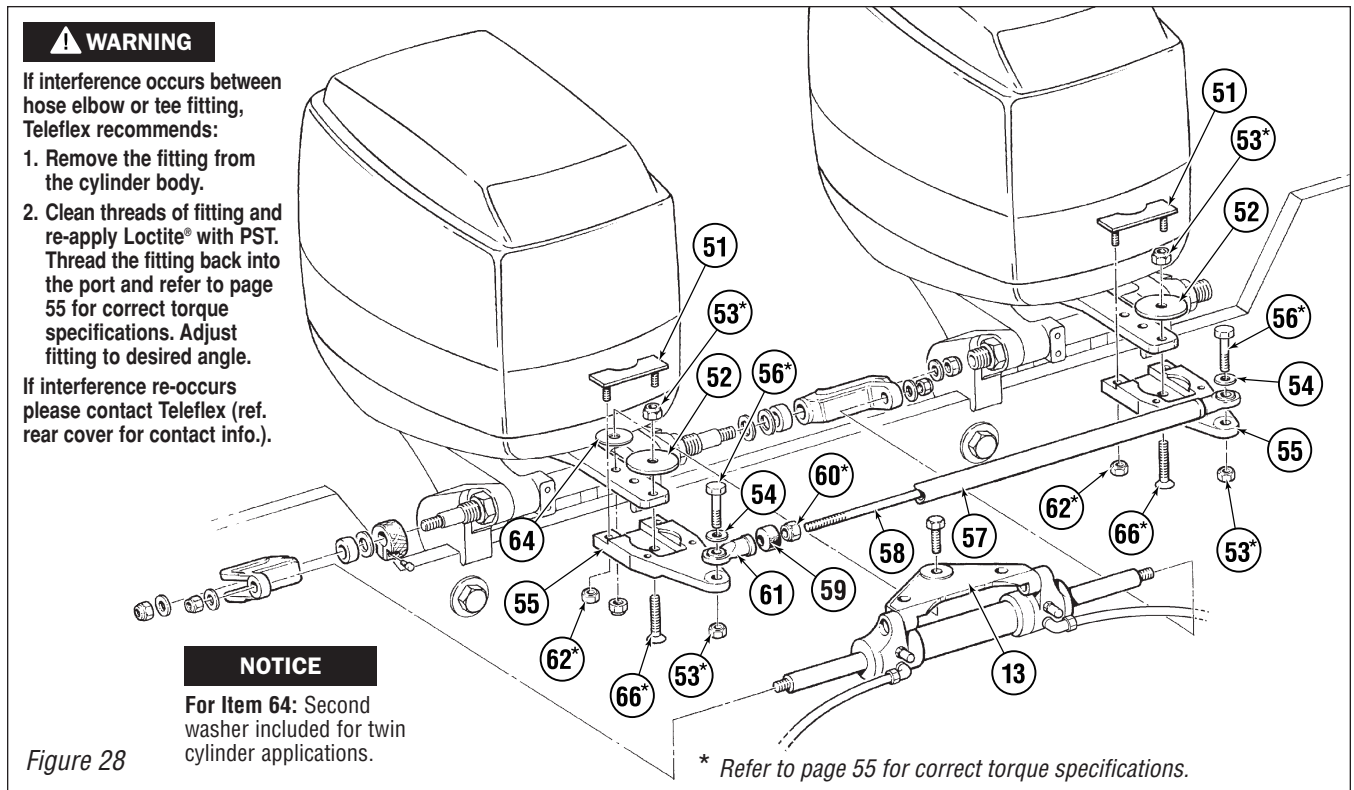


Figure 28

ITEM	PART #	QTY	DESCRIPTION
51	722829	2	Clamp Plate
52	753428	2	Bottom Washer (MC)
*53	113529	4	Nut 3/8" NF Nylok®
54	113622	2	Washer 3/8" dia.
*56	186426	2	Screw 3/8" NF x 2-1/4" HHCS
57	722721	1	Stringer Tube
58	722523	1	Threaded Rod c/w Ball Joint
59	746123	1	Obsolete—No longer required
*60	192126	1	Nut 1/2" NF Nylok®
61	116527	1	Ball Joint
*62	191424	4	Nut 1/4" NC Nylok®
64	113600	2	Washer 3/8" x 1-1/4" x .062" SS
*66	186000	2	Screw 3/8" x 1-1/4" Flat Head

ITEM	PART #	QTY	DESCRIPTION
PARTS SPECIFIC TO H05072A & H05071A			
55	739425	2	Extension Plate
PARTS SPECIFIC TO H05073A			
55	835120	2	Extension Plate
PARTS SPECIFIC TO H05030A & H05001A			
55	710030	2	Extension Plate

ASSEMBLY ORDER:

- 1) Assemble items 51, 55 & 62 only, in position shown.
- 2) Slide pivot plate (item 13) over extension plate (item 55) & push as far to back of motor as possible.
- 3) Install bolt (item 63) through extension plate & tiller arm.
- 4) Assemble cylinder assembly, with fender washer (item 64) as per installation instructions.
- 5) Install remaining parts as indicated.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

NOTICE Teleflex Marine is no longer manufacturing engine extension plates for any engine built after 2004. Please see pages 18-28 for cylinder and tiebar part numbers.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	SINGLE	ENGINE ADAPTER PLATES	
					TWIN c/w tie-rod	TWIN w/o tie rod
JOHNSON/EVINRUDE	1991 TO 2004	200-225 HP	HC5345	NOT REQ.	H05071A	H05072A
	1997 TO 2004	75-175HP FIGHT	HC5345	NOT REQ.	H05071A	H05072A
	1977 TO 1990	90-300HP	HC5342	NOT REQ.	H05001A	H05030A

WARNING

If interference occurs between hose elbow or tee fitting, Teleflex recommends:

1. Remove the fitting from the cylinder body.
 2. Clean threads of fitting and re-apply Loctite® with PST. Thread the fitting back into the port and refer to page 55 for correct torque specifications. Adjust fitting to desired angle.
- If interference re-occurs please contact Teleflex (ref. rear cover for contact info.).

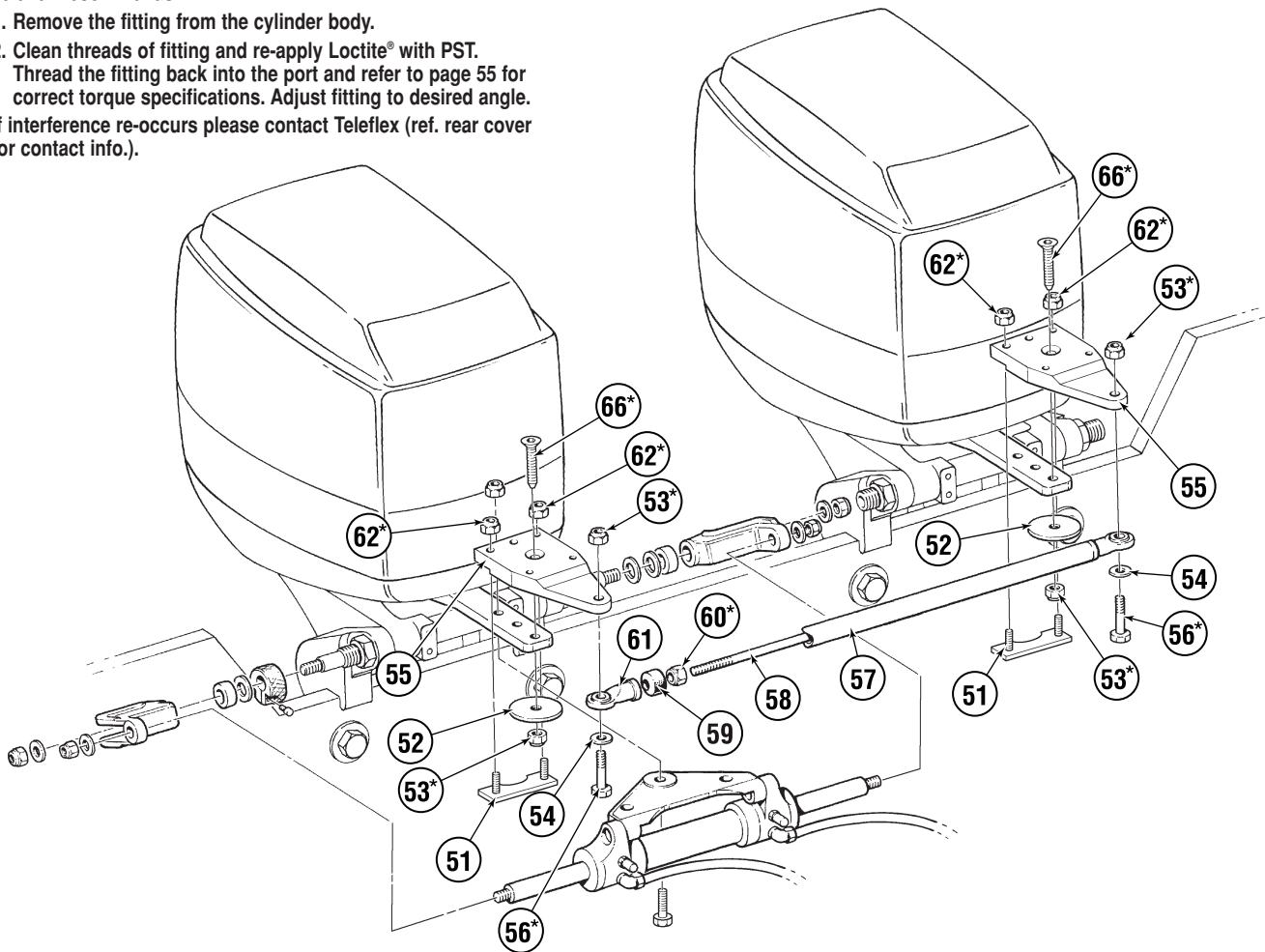


Figure 29

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
51	722829	2	Clamp Plate
52	753428	2	Bottom Washer (MC)
*53	113529	4	Nut 3/8" NF Nylok®
54	113622	2	Washer 3/8" dia.
55	739425	2	Extension Plate
*56	186426	2	Screw 3/8" NF x 2-1/4" HHCS
57	722721	1	Stringer Tube

ITEM	PART #	QTY	DESCRIPTION
58	722523	1	Threaded Rod c/w Ball Joint
59	746123	1	Obsolete—No longer required
*60	192126	1	Nut 1/2" NF Nylok®
61	116527	1	Ball Joint
*62	191424	4	Nut 1/4" NC Nylok®
64	113600	2	Washer 3/8" x 1-1/4" x .062" SS (Not Used)
*66	186000	2	Screw 3/8" x 1-1/4" Flat Head

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

NOTICE Teleflex Marine is no longer manufacturing engine extension plates for any engine built after 2004. Please see pages 18-28 for cylinder and tiebar part numbers.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	SINGLE	ENGINE ADAPTER PLATES		NOTE
					TWIN c/w tie-rod	TWIN w/o tie rod	
SUZUKI	1986 TO 2004	150-225HP	HC5345	NOT REQ.	H05071A	H05072A	

WARNING

If interference occurs between hose elbow or tee fitting, Teleflex recommends:

1. Remove the fitting from the cylinder body.
2. Clean threads of fitting and re-apply Loctite® with PST. Thread the fitting back into the port and refer to page 55 for correct torque specifications. Adjust fitting to desired angle.

If interference re-occurs please contact Teleflex (ref. rear cover for contact info.).

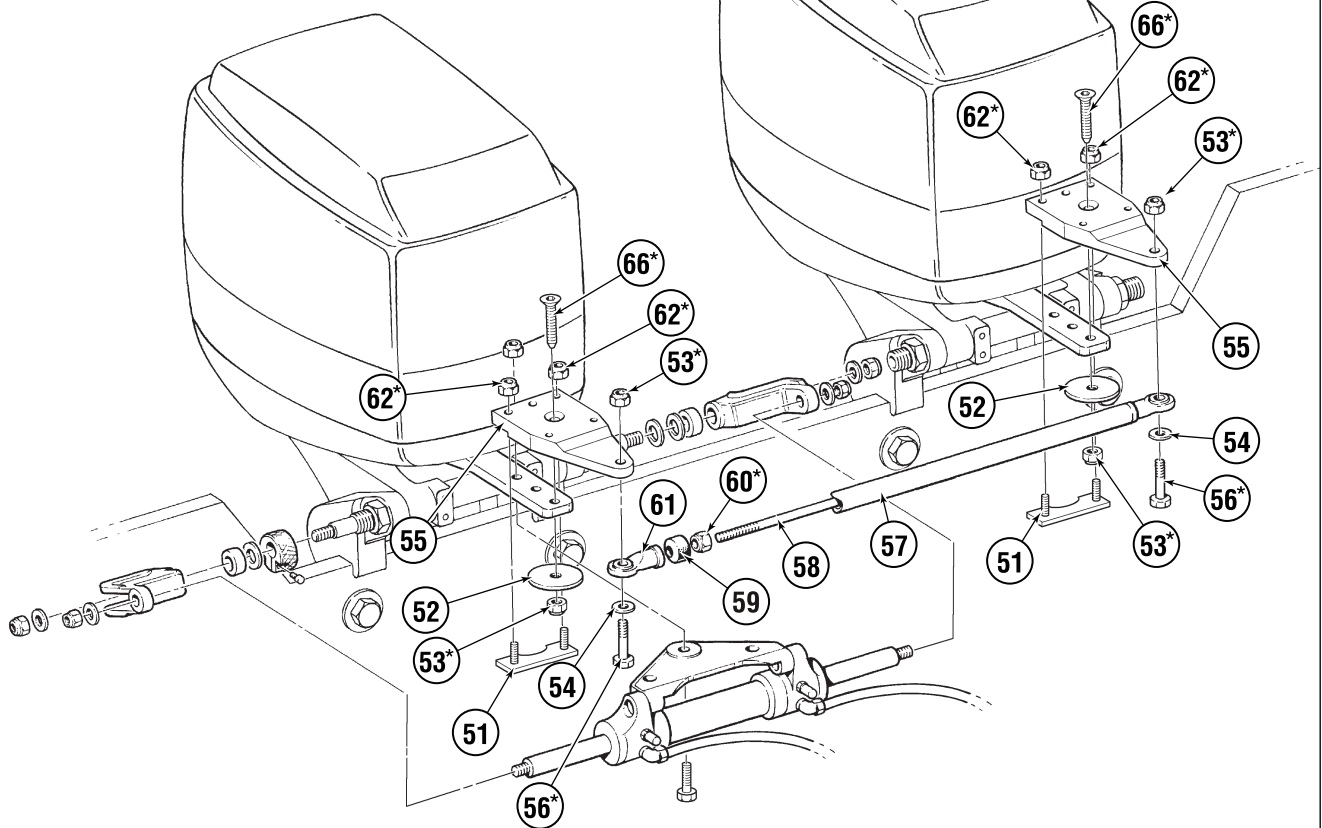


Figure 30

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
51	722829	2	Clamp Plate
52	753428	2	Bottom Washer (MC)
*53	113529	4	Nut 3/8" NF Nylok®
54	113622	2	Washer 3/8" dia.
55	739425	2	Extension Plate
*56	186426	2	Screw 3/8" NF x 2-1/4" HHCS
57	722721	1	Stringer Tube

ITEM	PART #	QTY	DESCRIPTION
58	722523	1	Threaded Rod c/w Ball Joint
59	746123	1	Obsolete—No longer required
*60	192126	1	Nut 1/2" NF Nylok®
61	116527	1	Ball Joint
*62	191424	4	Nut 1/4" NC Nylok®
64	113600	2	Washer 3/8" x 1-1/4" x .062" SS (Not Used)
*66	186000	2	Screw 3/8" x 1-1/4" Flat Head

INSTALLATION INSTRUCTIONS

TWIN ENGINES

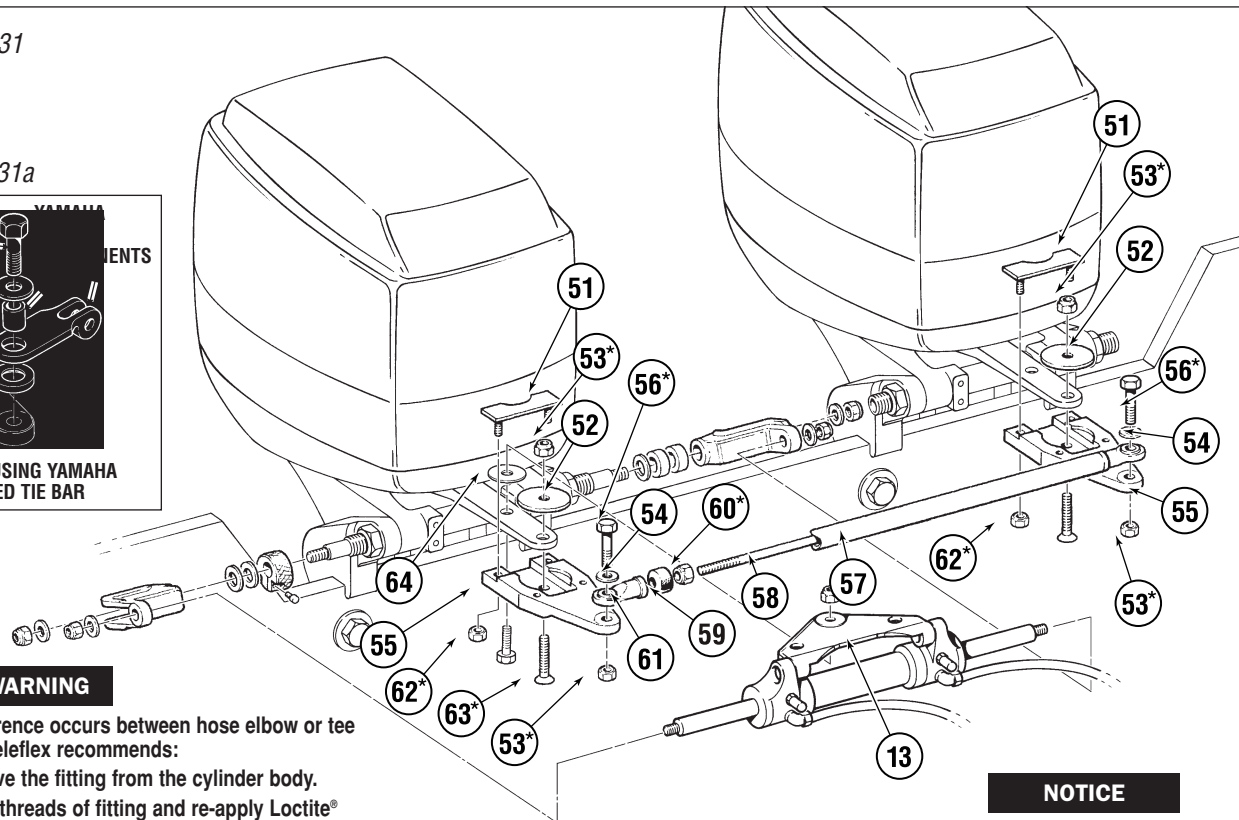
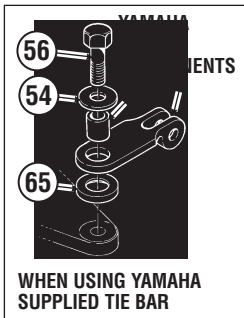
WARNING Refer to page 55 for correct torque specifications of all installation hardware.

NOTICE Teleflex Marine is no longer manufacturing engine extension plates for any engine built after 2004. Please see pages 18-28 for cylinder and tiebar part numbers.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	SINGLE	ENGINE ADAPTER PLATES	
					TWIN c/w tie-rod	TWIN w/o tie rod
YAMAHA	1987 TO 1996	115-200 HP	HC5345	NOT REQ.	H05006A	H05036A
	1990 TO 2004	225-250 HP	HC5345	NOT REQ.	H05011A	H05047A

Figure 31

Figure 31a



WARNING

If interference occurs between hose elbow or tee fitting, Teleflex recommends:

1. Remove the fitting from the cylinder body.
2. Clean threads of fitting and re-apply Loctite® with PST. Thread the fitting back into the port and refer to page 55 for correct torque specifications. Adjust fitting to desired angle.

If interference re-occurs please contact Teleflex (ref. rear cover for contact info.).

NOTICE

For Item 64: Second washer included for twin cylinder applications.

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
51	722829	2	Clamp Plate
52	753428	2	Bottom Washer (MC)
*53	113529	4	Nut 3/8" NF Nylok®
54	113622	2	Washer 3/8" dia.
*56	186426	2	Screw 3/8" NF x 2-1/4" HHCS
57	722721	1	Stringer Tube
58	722523	1	Threaded Rod c/w Ball Joint
59	746123	1	Obsolete—No longer required
*60	192126	1	Nut 1/2" NF Nylok®
61	116527	1	Ball Joint
*62	191424	4	Nut 1/4" NC Nylok®
*63	185999	2	Screw 3/8" x 1-5/8" Flat Head
64	113600	2	Washer 3/8" x 1-1/4" x .062" SS
65	468721	2	Spacer (for use with Yamaha Tie Bar)

ITEM	PART #	QTY	DESCRIPTION
PARTS SPECIFIC TO H05036A & H05006A			
55	727221	2	Extension Plate
PARTS SPECIFIC TO H05047A & H05011A			
55	709028	2	Extension Plate

ASSEMBLY ORDER:

- 1) Assemble items 51, 55 & 62 only, in position shown.
- 2) Slide pivot plate (item 13) over extension plate (item 55) & push as far to back of motor as possible.
- 3) Install bolt (item 63) through extension plate & tiller arm.
- 4) Assemble cylinder assembly, with fender washer (item 64) as per installation instructions.
- 5) Install remaining parts as indicated.

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

NOTICE Teleflex Marine is no longer manufacturing engine extension plates for any engine built after 2004. Please see pages 18-28 for cylinder and tiebar part numbers.

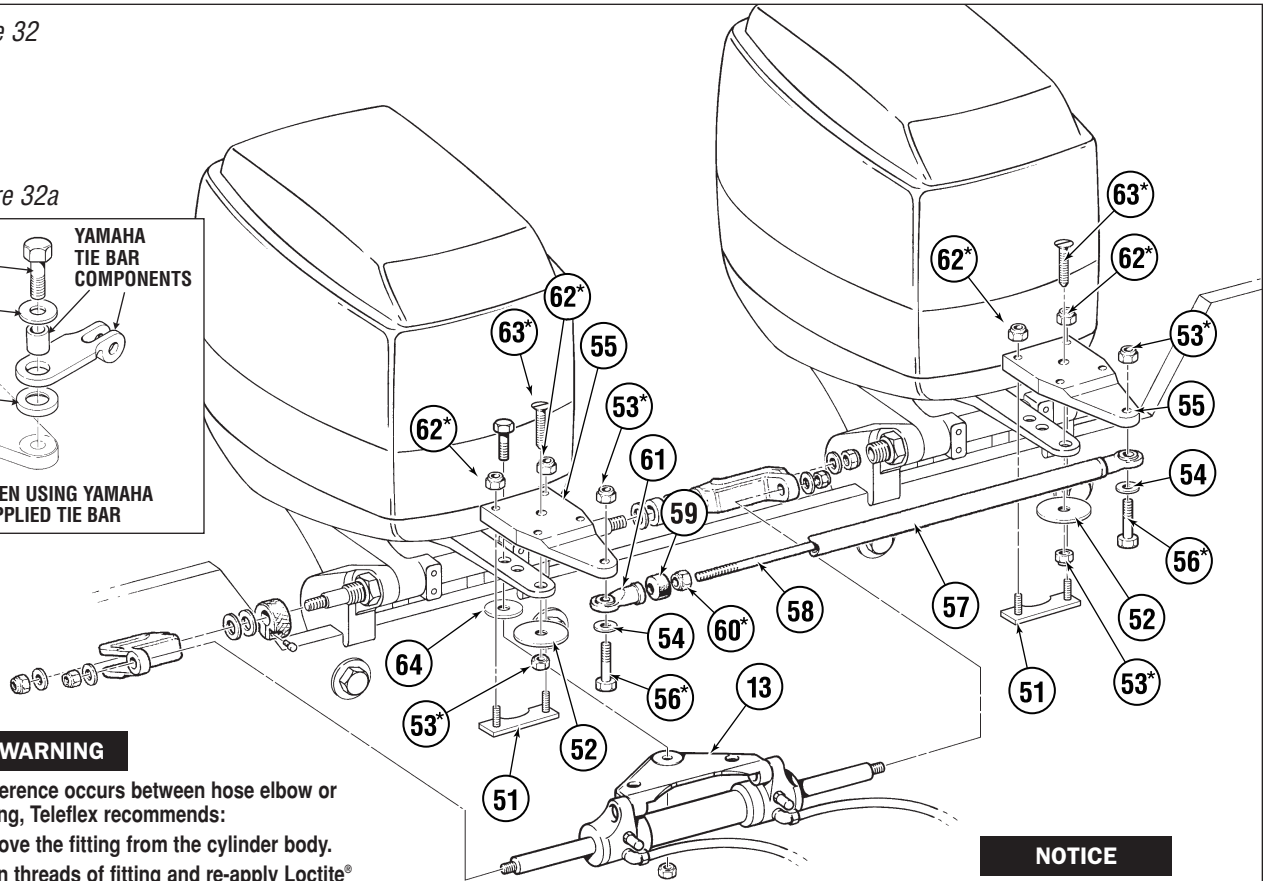
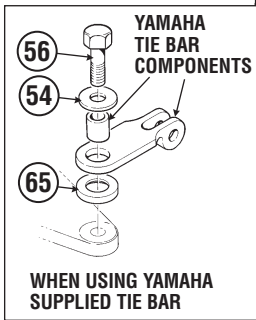
INSTALLATION INSTRUCTIONS

TWIN ENGINES

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	SINGLE	ENGINE ADAPTER PLATES	
					TWIN c/w tie-rod	TWIN w/o tie rod
YAMAHA	1997 TO 2004	100-130 HP	HC5345	NOT REQ.	H05006A	H05036A

Figure 32

Figure 32a



WARNING

If interference occurs between hose elbow or tee fitting, Teleflex recommends:

1. Remove the fitting from the cylinder body.
2. Clean threads of fitting and re-apply Loctite® with PST. Thread the fitting back into the port and refer to page 55 for correct torque specifications. Adjust fitting to desired angle.

If interference re-occurs please contact Teleflex (ref. rear cover for contact info.).

NOTICE

For Item 64: Second washer included for twin cylinder applications.

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
51	722829	2	Clamp Plate
52	753428	2	Bottom Washer (MC)
*53	113529	4	Nut 3/8" NF Nylok®
54	113622	2	Washer 3/8" dia.
55	727221	2	Extension Plate
*56	186426	2	Screw 3/8" NF x 2-1/4" HHCS
57	722721	1	Stringer Tube
58	722523	1	Threaded Rod c/w Ball Joint
59	746123	1	Obsolete—No longer required
*60	192126	1	Nut 1/2" NF Nylok®
61	116527	1	Ball Joint

ITEM	PART #	QTY	DESCRIPTION
*62	191424	4	Nut 1/4" NC Nylok®
*63	185999	2	Screw 3/8" x 1-5/8" Flat Head
64	113600	2	Washer 3/8" x 1-1/4" x .062" SS
65	468721	2	Spacer (for use with Yamaha Tie Bar)

ASSEMBLY ORDER:

- 1) Assemble items 51, 55 & 62 only, in position shown.
- 2) Slide pivot plate (item 13) over extension plate (item 55) & push as far to back of motor as possible.
- 3) Install bolt (item 63) through extension plate & tiller arm.
- 4) Assemble cylinder assembly, with fender washer (item 64) as per installation instructions.
- 5) Install remaining parts as indicated.

INSTALLATION INSTRUCTIONS

TWIN ENGINES

WARNING Refer to page 55 for correct torque specifications of all installation hardware.

H06010-Single Cylinder Trolling Motor Tiebar Kit

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE ADAPTER KIT	NOTE
ALL	1991 TO DATE	Kicker or Trolling Motor	HC5345	H06010	See Fig. 33a

NOTICE

Fully tilt engine and turn steering wheel from hard over to hard over. Insure that no interference occurs at any point between the Steering Cylinder, Adapter Bracket or Tie Bar and any part of the engine or transom area.

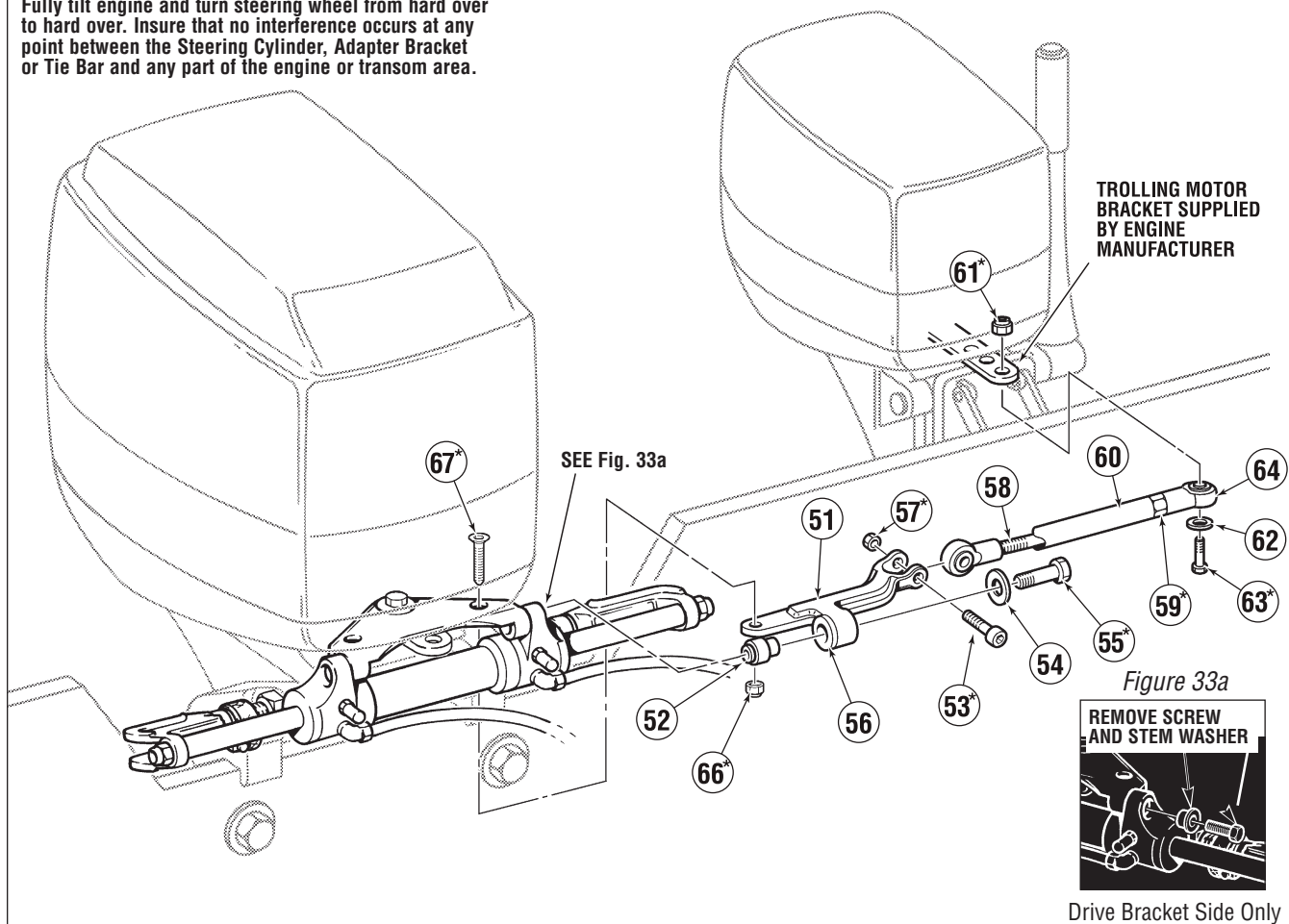


Figure 33

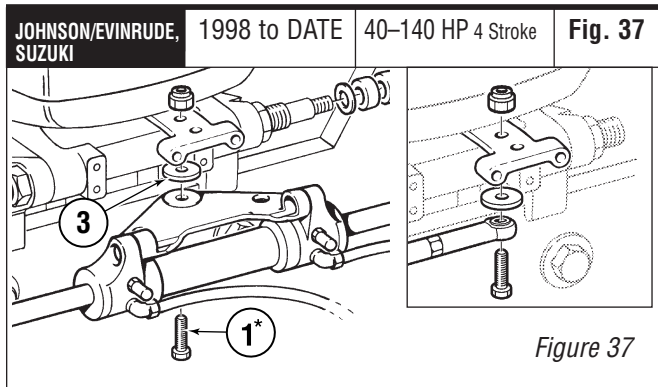
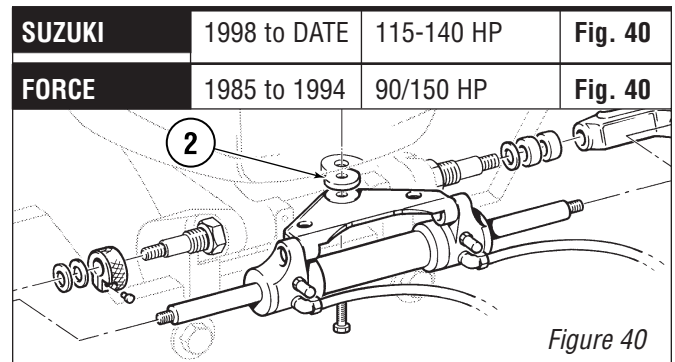
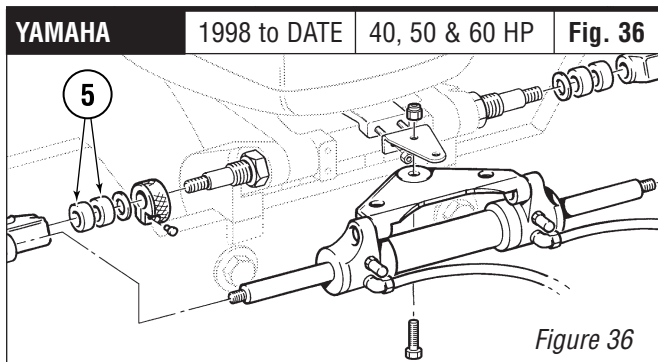
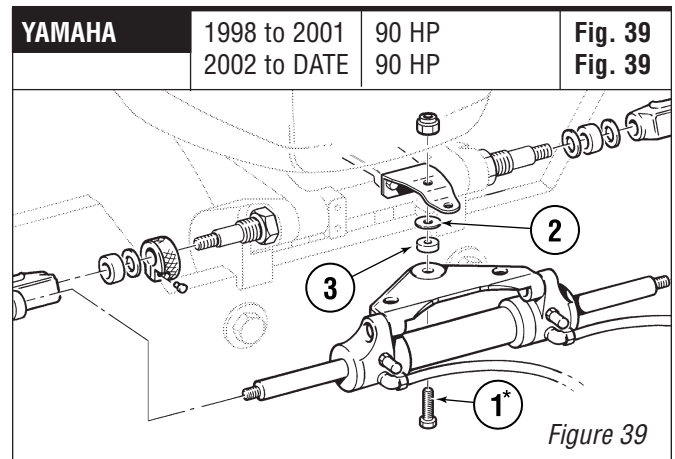
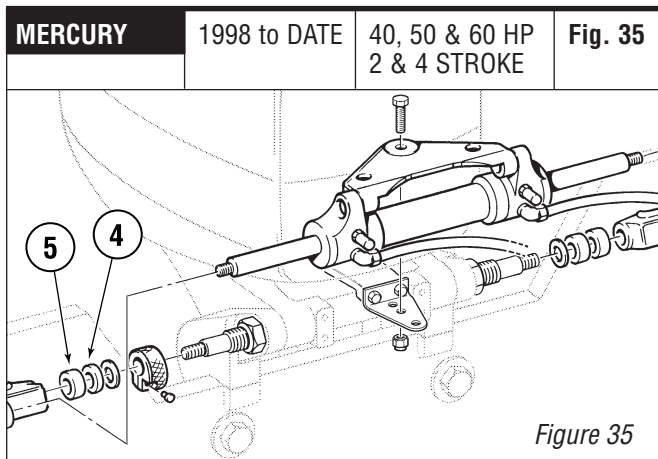
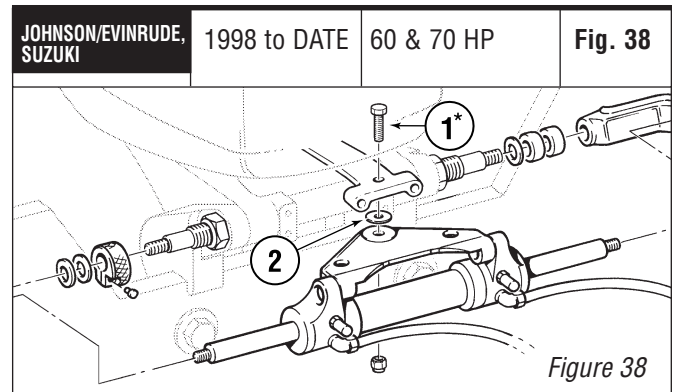
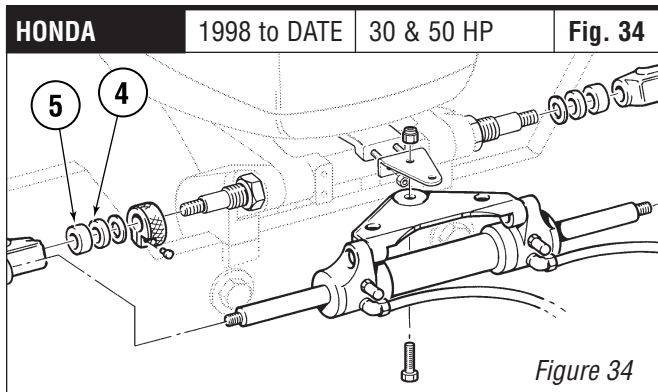
* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
51	961650	1	Drive Bracket
52	961686	1	Spacer
*53	186540	1	Shoulder Bolt, 1-1/4", SS
54	010924	1	Washer, 5/16" Flat 3/4" OD SS
*55	961704	1	HHCS, 5/16" NC x 2-1/2", SS NLP
56	748668	1	Bush, Flange
*57	704525	1	Nut, Nylok®, 5/16" NC, SS
58	722547	1	Tie Bar c/w Ball Joint

ITEM	PART #	QTY	DESCRIPTION
*59	192126	1	Nut, Nylok®, 1/2" NF, Ni PI Br
60	620527	1	PVC Tubing
*61	113529	1	Nut, Nylok®, 3/8" NF, Thin, SS
62	113622	1	Washer, 3/8" Flat 7/8" OD SS
*63	726825	1	HHCS, 3/8" NF x 1-3/4" SS
64	116527	1	Rod End SS 1/2" NF
*66	113021	1	Nut, Nylok®, 5/16" NC, Thin, SS
*67	185901	1	FHSCS, 5/16" NC x 7/8", SS

▲ WARNING Refer to page 55 for correct torque specifications of all installation hardware.

H05090 Spacer Kit For Use with Teleflex Hydraulic Steering Cylinder HC5345 & HC5358



ITEM	PART #	QTY	DESCRIPTION
*1	688726	1	HHCS 3/8" NF x 2-1/4" SS (Tiller Bolt)
2	113600	1	SS Fender Washer
3	773421	1	Aluminum Spacer 1/2"
4	728994-1	1	3/16" Spacer, Yamaha
5	995876	2	Thick Nylon Spacer 3/8"

* Refer to page 55 for correct torque specifications.

INSTALLATION INSTRUCTIONS

TRIPLE ENGINES

⚠ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you **MUST** use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS		NOTE
				STARBOARD ENG. TO DRIVE CYL.	PORT CYL. TO DRIVE CYL.	
FORCE	1995 TO DATE	90-120 HP	HC5345	H06001	H06002	See Fig. 41
HONDA	1996 TO DATE	75-90 HP	HC5345	H06001	H06002	See Fig. 41 Min. Engine Centers=29"
MERCURY/MARINER	1989 TO DATE	75-275 HP	HC5345	H05081		See Fig. 44
YAMAHA	1990 TO DATE	100-200 HP	HC5358	H06001	H06002	See Fig. 41
	1990 TO DATE	225-300 HP	HC5358	H05080		See Fig. 43
	2007 TO DATE	350HP	<i>MUST USE Tournament Type Steering Cylinders</i>			
JOHNSON/EVINRUDE	1991 TO DATE	90-175 HP	HC5345	H06001	H06002	See Fig. 42
	1991 TO DATE	250-300 HP	HC5345	H06001	H06002	See Fig. 42
	1991 TO DATE	200-225 HP	HC5345	H06003	H06002	See Fig. 42
	1996 TO DATE	90-225 HP FIGHT	HC5345	H05080		See Fig. 43 & 43a Min. Engine Centers=29"
SUZUKI	1986 TO DATE	150-225 HP	HC5345	H06003	H06002	See Fig. 42
	1986 TO DATE	115-140 HP	HC5345	H06003	H06002	See Fig. 42

NOTICE

Refer to your specific engine application for detailed installation instructions.

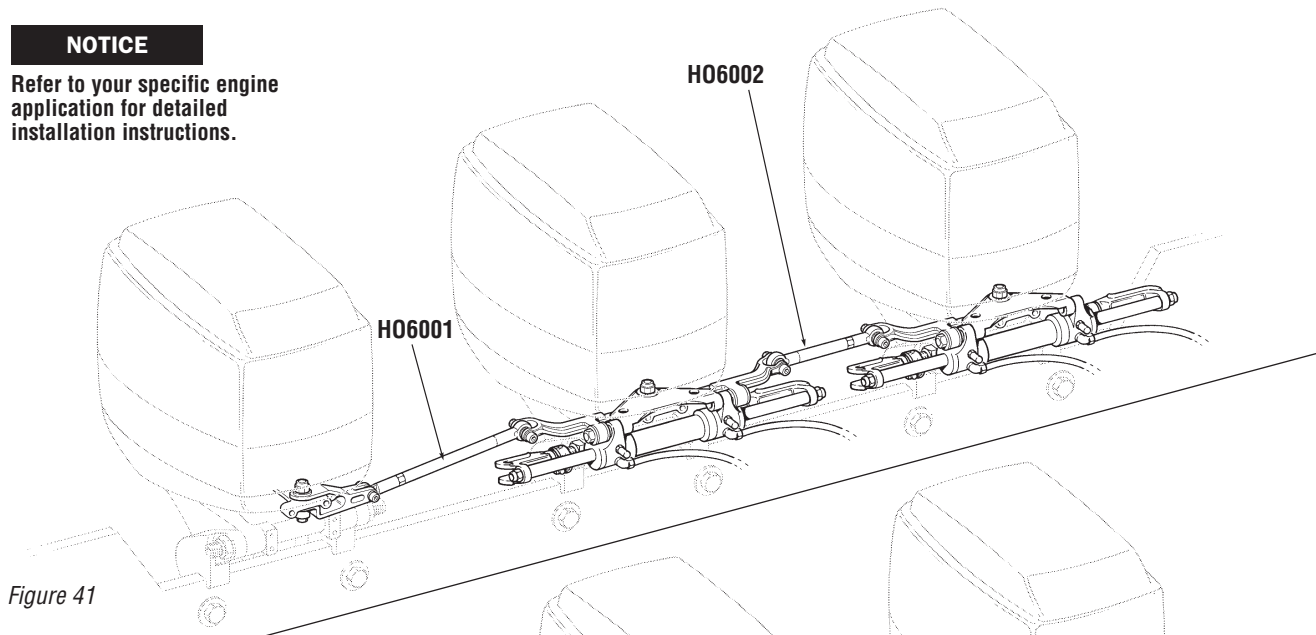


Figure 41

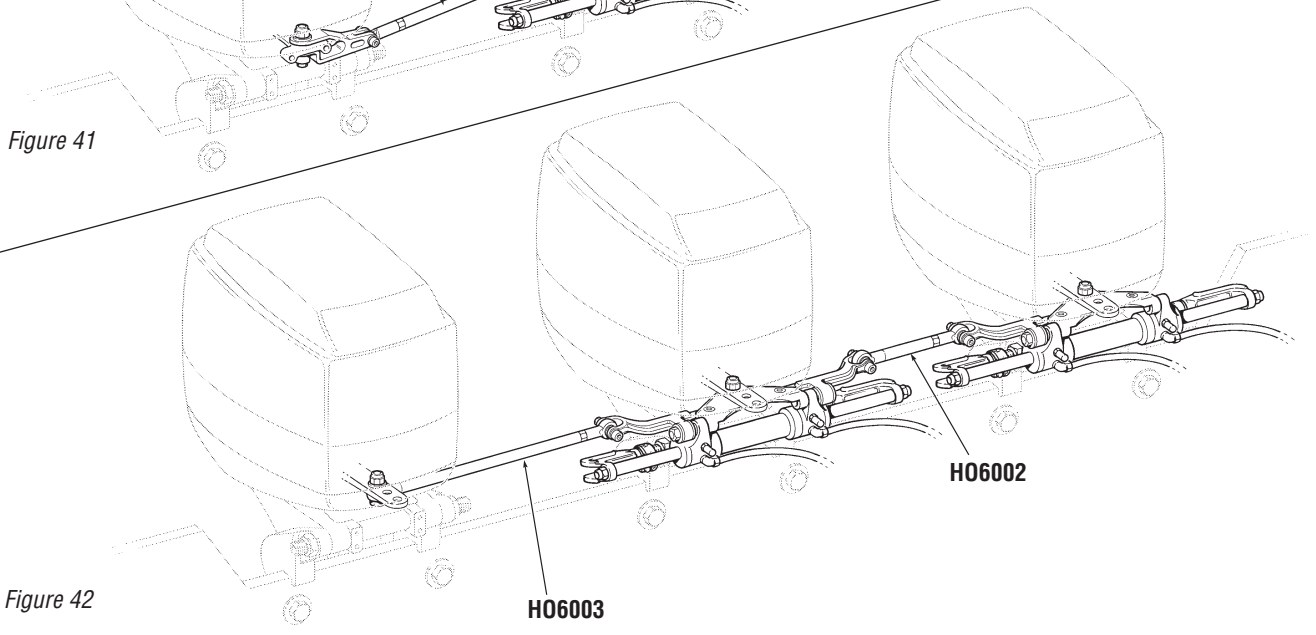


Figure 42

▲ WARNING The steering equipment noted below is for use in boats that are used in a "normal" fashion. For ALL performance orientated, or, any boat that is rigged with engines that exceed 300HP per engine, you **MUST** use the Tournament Type Steering Cylinder and tie bars to ensure safe operation of your boat. Refer to page 55 for correct torque specifications of all installation hardware.

INSTALLATION INSTRUCTIONS

TRIPLE ENGINES

For **HC5345** Cylinder Installation **ONLY**

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS	NOTE
JOHNSON/EVINRUDE	1996 TO DATE	90-225 HP FICHT	HC5345	H05080	Min. Eng. Centers 29" See Fig. 43a
YAMAHA	1990 TO DATE	225-300 HP	HC5358	H05080	NOT FOR USE WITH YAMAHA 350 HP ENGINES

NOTICE

Refer to page 43 for H05080 and H05081 tie bar instructions.

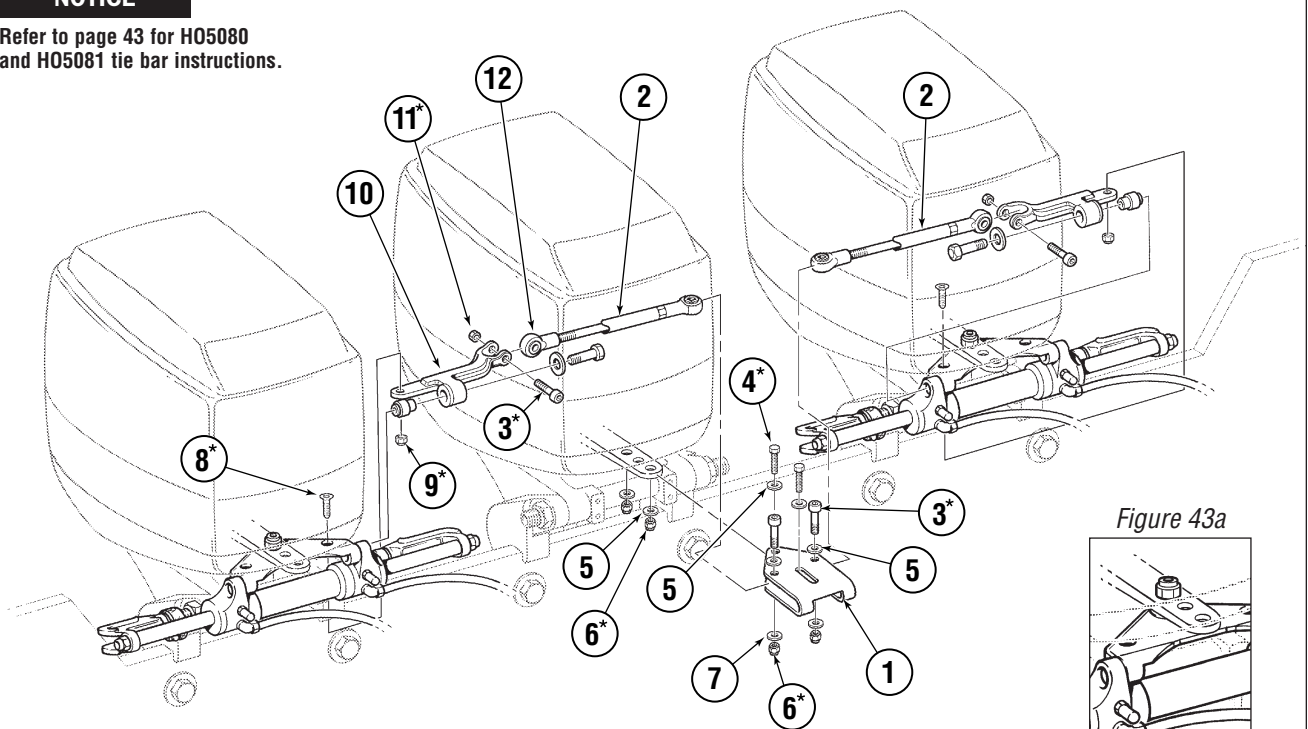
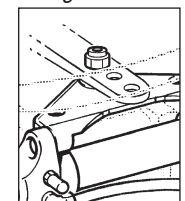


Figure 43a



Johnson/Evinrude
Ficht 90-225HP

Figure 43

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
1	700010	1	Triple Engine Bracket
2	722543	2	Tie Bar
*3	186540	4	3/8" x 1-1/4" Shoulder Bolt, SS
*4	113222	2	3/8" NF x 1-1/4" HHCS Bolt, SS
5	113622	6	3/8" Flat Washer, SS
*6	113529	2	3/8" NF Nylok® Nut (Thin), SS
7	010924	2	5/16" Flat Washer, SS

ITEM	PART #	QTY	DESCRIPTION
*8	185901	2	FHCS, 5/16" NC x 3/4", SS
*9	113021	4	5/16" NC Nylok® Nut (Thin), SS
10	961665	2	Drive Bracket Assembly
*11	704525	2	5/16" NC Nylok® Nut, SS
12	116527	2	Rod End Ball 1/2", SS

INSTALLATION INSTRUCTIONS

TRIPLE ENGINES

For HC5345 Cylinder Installation **ONLY**

⚠ WARNING Refer to page 55 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	ENGINE TIE BAR KITS	NOTE
MERCURY/MARINER	1991 TO DATE	75-275 HP	HC5345 (2)	H05081	

NOTICE

Refer to page 43 for H05080 and H05081 tie bar instructions.

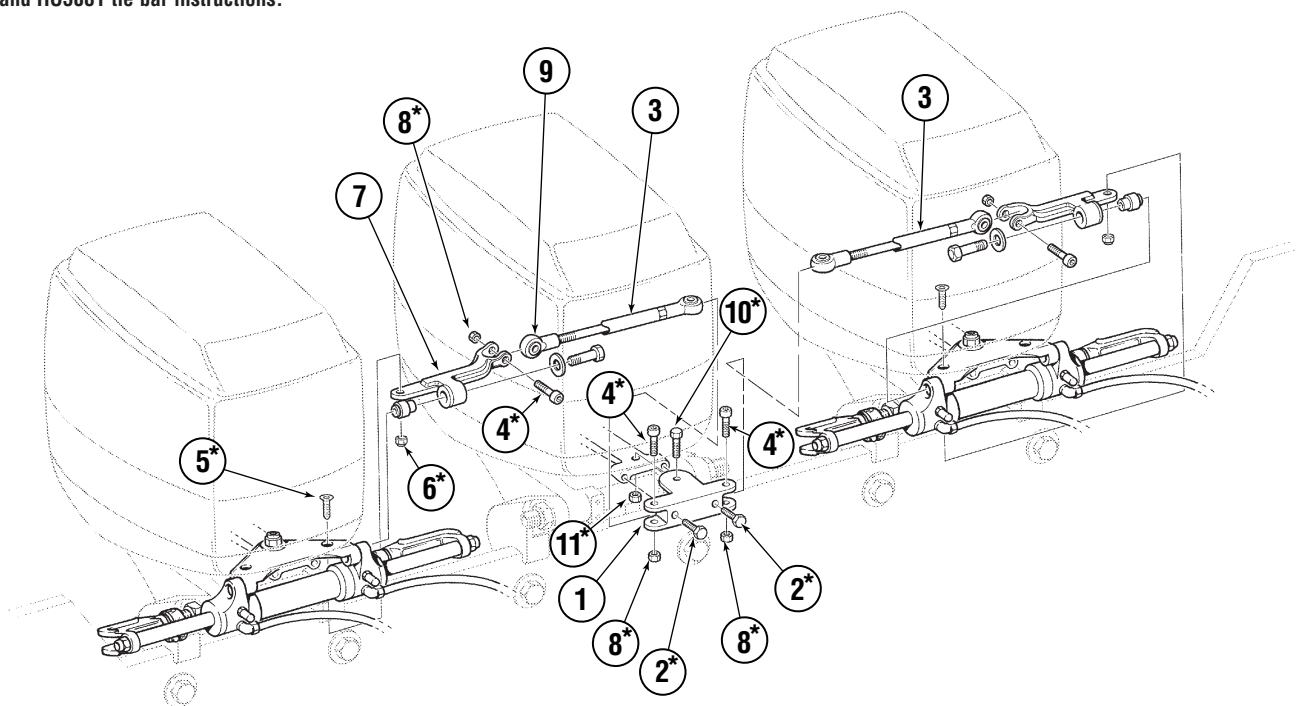


Figure 44

* Refer to page 55 for correct torque specifications.

ITEM	PART #	QTY	DESCRIPTION
1	741134	1	Bracket, Tiebar
*2	750027	2	HHCS, 5/16" UNF x 1-1/2", SS, NLS
3	722543	2	Tie Bar
*4	186540	4	3/8" x 1-1/4" Shoulder Bolt, SS
*5	185901	2	FHCS, 5/16" NC x 7/8", SS
*6	113021	2	Nut, 5/16" NC Nylok®, Thin, SS

ITEM	PART #	QTY	DESCRIPTION
7	961665	2	Drive Bracket Assembly
*8	704525	4	5/16" NC Nylok® Nut, SS
9	116527	2	Rod End Ball 1/2", SS
*10	113330	1	HHCS, 3/8" NF x 1-3/8", SS, FT
*11	113529	1	Nut, 3/8" NF Nylok®, Thin, SS

New Style Tie Bar Installation

(Tie Bar Kit # H05080 and H05081)

⚠ WARNING

Refer to page 7 of your installation instructions for important warnings and information regarding the correct installation of your SeaStar hydraulic hose.

Cut the threaded end of the tie bar and tube to length using the following formulas below:

⚠ CAUTION The CD dimension must include allowance for engine toe in/out as required, or recommended by the engine manufacturer. Failing to observe toe in/out recommendations may result in harder than normal steering effort.

⚠ WARNING

At the time of installation and any other time thereafter, the threaded rod must always fully cover inspection hole 1 of the rod end, but never inspection hole 2. Failing to observe this warning may result in one engine becoming separated from the steering system resulting in property damage and/or personal injury.

The SeaStar tie bar is designed for use on Teleflex/SeaStar cylinders only. It may not be compatible with other cylinders.

Note: Maximum standard engine center = 3ft. (0.9m)

H05080

X=CD - 11.375

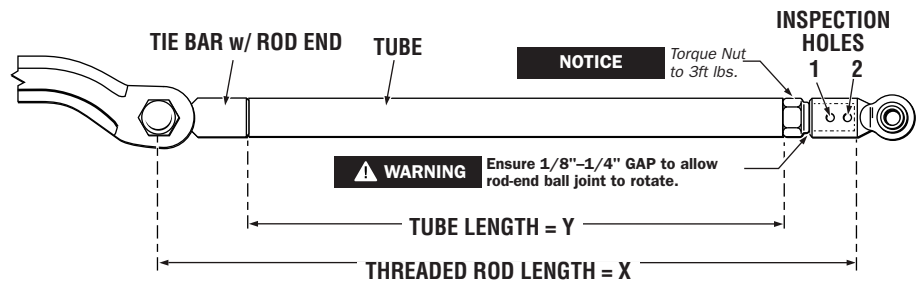
Y=CD - 14.375

H05081

X=CD - 11.125

Y=CD - 14.125

Note: H05080 and H05081 Minimum Engine centers = 24" (610mm)



⚠ CAUTION

Ensure that each cylinder is allowed to hit its piston stop. The tie-bar may have to be disconnected.

Failure to do so may fail to purge all the air from the system, causing poor performance.

Side Mount Cylinder Installation

(Part # HC5370)

All applications

All linkages for connecting the cylinder extension rod to the tiller arm are engine manufacturer items and must be purchased by the installer, builder or owner.

This cylinder is mounted to the tilt tube in the same manner as a push-pull steering cable.

! WARNING

DO NOT use Side Mount Cylinder with SeaStar Pro or SeaStar Pro tilt helms (Part # HH5770, HH5772 and HH5774).

This unbalanced cylinder can exert a greater force while pushing the cylinder rod out of the cylinder barrel. By mounting cylinder on the appropriate side, engine torque, and steering loads can be balanced.

Slide the **well greased** extension rod into the thoroughly cleaned and rust free tilt tube.

Attach cylinder rod end to extension rod by inserting it into mating hole of extension rod.

Align holes in cylinder rod and extension rod and insert special pin (item 3) through hole joining both rods together. If the holes do not align properly, rotate the extension rod 180°.

! WARNING

DO NOT modify or change the pin or the hole in the cylinder rod and extension rod. Any modification can greatly reduce the strength and integrity of this attachment point and result in total loss of steering, causing property damage and/or personal injury.

While holding the pin in place, slide the rod and pin assembly into the tilt tube.

Attach cylinder to tilt tube by threading the hex portion of the cylinder end to the tilt tube until fully engaged and tightened.

Resistance will be apparent due to the anti-vibration pellet.

If applicable, connect the tie bar to the tiller arms.

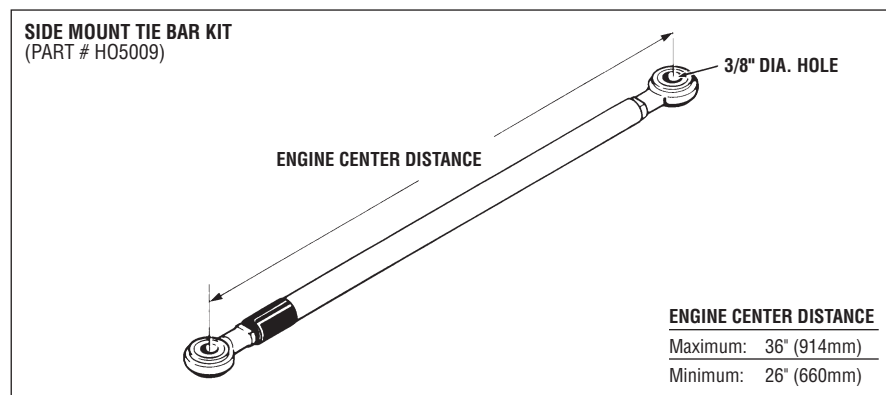


Figure 45

Splashwell Mount Cylinder Installation (Part # HC5380)

All Applications

Before attempting installation of the HC5380 Splashwell Mount Cylinder, consult the mounting configuration below for the proper position of the Mounting Foot on the Transom. As the Splashwell Mount Cylinder requires through bolting on the Transom, it will be necessary to contact the boat manufacturer for proper preparation of the Transom holes.

⚠ WARNING

DO NOT use Splashwell Mount Cylinder with SeaStar Pro or SeaStar Pro tilt helms (Part #s HH5770, HH5772 and HH5774).

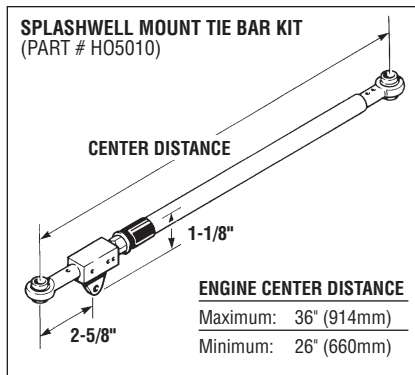


Figure 46

- Step 1) Draw out the mounting configuration of the Cylinder, including the proposed 3/8" drill holes on the Transom. Check at least twice before drilling.
- Step 2) Drill and prepare through Transom holes as recommended by your boats manufacturer.
- Step 3) Secure the HC5380 Splashwell Mount Cylinder to the Transom and with bolt provided connect Rod End of Cylinder to Tiller Arm.
- Step 4) Secure the Outboard Hydraulic Hoses to the Steering Cylinder and refer to the filling and purging instructions on page 47.

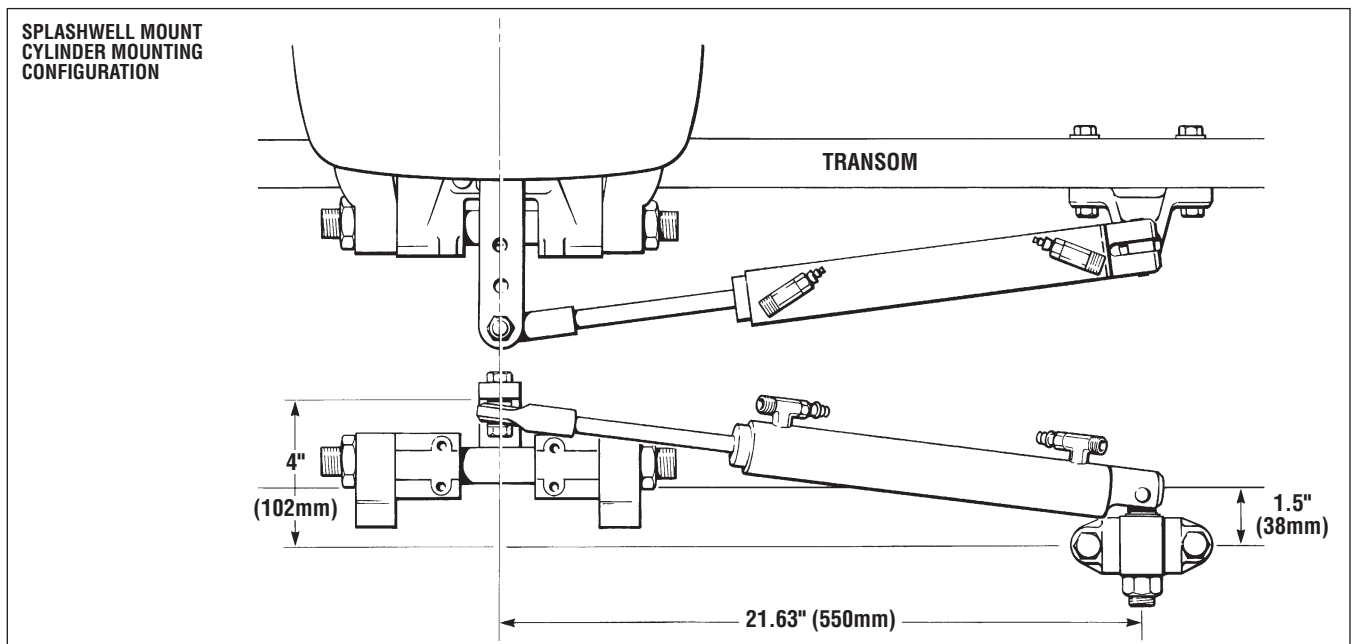


Figure 47

HOSE CONNECTION

Refer to illustrations below for the correct connection of hoses from helm pump to cylinder.

When installing hydraulic hoses make sure that the bend restrictor is located at the steering cylinder.

Route hydraulic hoses with a gradual rise from SeaStar helm to cylinder(s) along gunwale or builder installed conduit.

DO NOT remove protective fitting caps until connection of hose fitting to helm and cylinder is complete. Use the shortest most convenient path for routing hoses without exceeding a minimum bend radius of 2-1/2" (6 cm).

Prevent mix-up in hose connections by marking one hose on both ends with tape or chalk.

⚠ CAUTION

Replacing our nickel plated brass fittings with brass or cad plated fittings may cause cylinder threads to corrode.

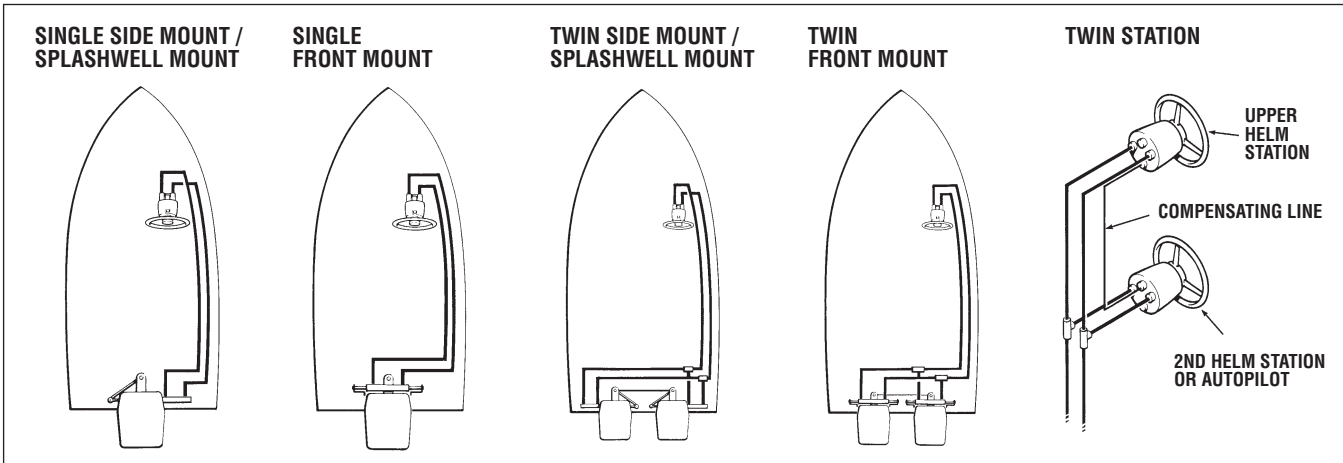
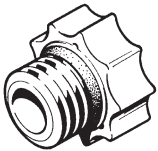


Figure 48

Fill Plugs for SeaStar Helms

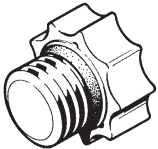
VENT PLUG - Part No. HA5431



SUPPLIED WITH SEASTAR HELM PUMP

- MUST BE USED WITH HELM PUMP ON ALL SINGLE STEERING STATION SYSTEMS.
- MUST BE USED ON UPPERMOST HELM PUMP ON MULTI STEERING STATION SYSTEMS.

NON-VENT PLUG - Part No. HA5432



- MUST BE USED ON ALL HELM PUMPS OTHER THAN UPPERMOST HELM PUMP ON MULTI STEERING STATION SYSTEMS.
- THIS NON-VENT PLUG IS SUPPLIED WITH ADDITIONAL STATION FITTING KIT NO. HF5501 AND HF5502.

Figure 49

Hydraulic Fluid

Recommended oils for your steering system are:

SeaStar Hydraulic Fluid, part no. HA5430 (1 quart), HA5440 (1 Gal.)

Texaco HO15

Aero Shell Fluid #41

Esso Univis N15

Chevron Aviation Fluid A

Mobil Aero HFA

Fluids meeting Mil H5606 specifications.

Automatic transmission fluid Dexron II may be used in an emergency.

⚠ CAUTION Never use brake fluid. Any non-approved fluid may cause irreparable damage, loss of steering, and cancellation of warranty.

In cases of extreme emergency any non-toxic, non-flammable fluid may provide temporary steering.

FILLING AND PURGING THE SYSTEM

Read First

These instructions show how to fill and purge a Single Station Front Mount Cylinder System. The same steps apply to Single Station Side Mount / Splashwell Mount Systems, the difference being which bleeder to open and close and the direction the cylinder rod moves. These variations are shown in inset diagrams at each step. For twin station and/or twin cylinder filling and purging instructions refer to instructions on page 50 first and then proceed with instructions on this page.

This procedure requires two people. One person may not be able to remove all the air from the system which will result in spongy, unresponsive steering.

During the entire filling procedure, oil **must** be visible in the filler tube. **DO NOT** allow the oil level to disappear into the helm pump, as this may introduce air into the system and increase your filling time.

Hydraulic Oil Requirements

2 bottles (2 quarts or liters) for single station and single cylinder systems.
1 additional bottle for each additional helm, cylinder, or auto pilot.

NOTICE

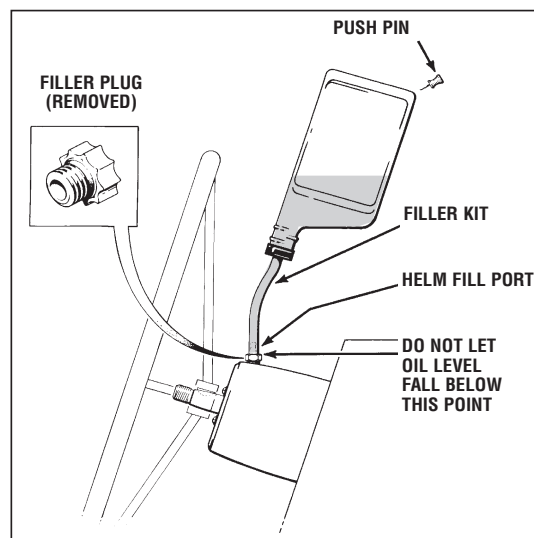
Oil can be re-used if filtered through a fine mesh screen such as used for gasoline. If unable to filter oil, an additional bottle of oil is required.

NOTICE

"Bleeder" may refer to cylinders fitted with bleed tee fittings or bleed screws. If fitted with bleed tee fitting, open bleeder by unscrewing bleed nipple nut two turns.

NOTICE

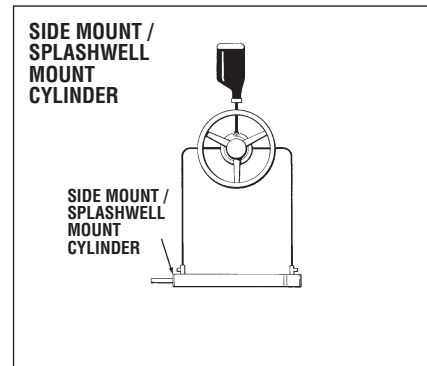
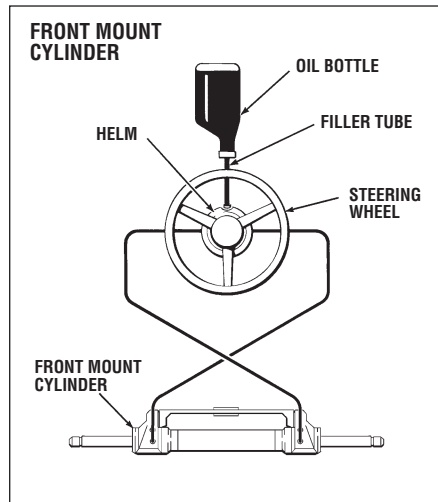
Filling the helm full of oil can be done faster if oil is poured into the helm prior to connecting filler tube and oil bottle to the helm. Part # HA5438.



Single Station One Cylinder

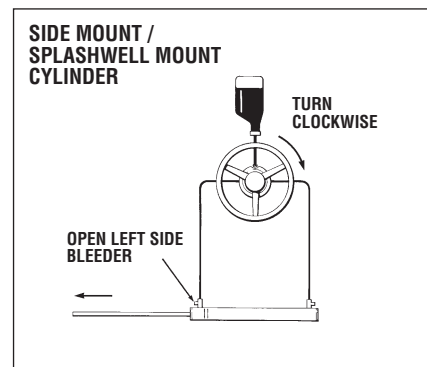
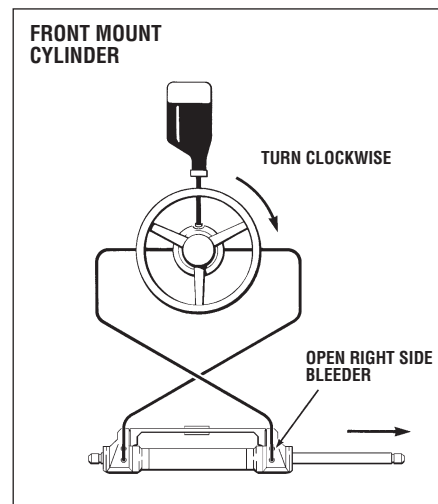
Step 1

- Screw the threaded end of the filler tube into the helm filler port.
- Remove the cap from the oil bottle and holding upright screw into the filler tube bottle cap. Poke hole in the bottom of the bottle.
- Fill the helm pump full of hydraulic oil so that it is visible in the filler tube. Oil should always be visible in the filler tube. Use the next bottle of fluid at any time during the procedure in order to maintain the oil level. **DO NOT** proceed with step two until helm is full.



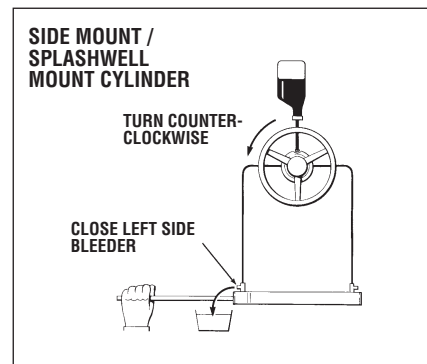
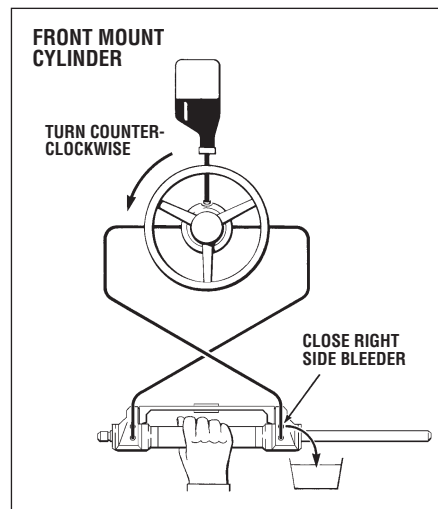
Step 2

- Turn the steering wheel clockwise until the cylinder rod is fully extended on the right side of the cylinder.
- Open right side bleeder.



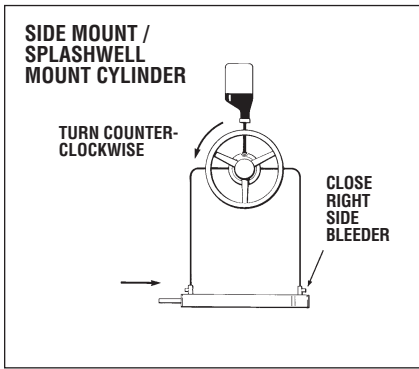
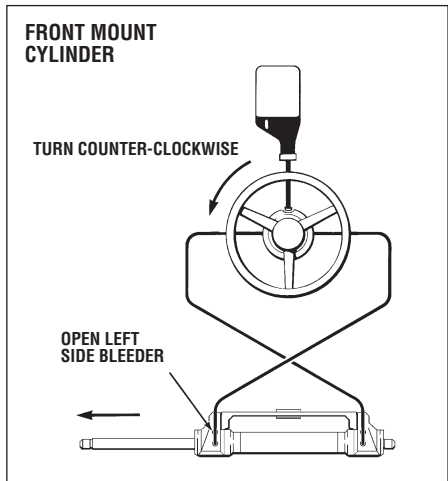
Step 3

- Holding the cylinder body (Front Mount cylinder) or rod (Side Mount cylinder) to prevent the body/rod from moving, turn the steering wheel counter-clockwise until a steady stream of air free oil comes out of the bleeder. (Drain approx. 1/2 bottle of oil or as required).
DO NOT use anything other than your hands to restrain the cylinder body/rod.
- While continuing to turn the wheel close the right side bleeder and let go of the cylinder body/rod.



Step 4

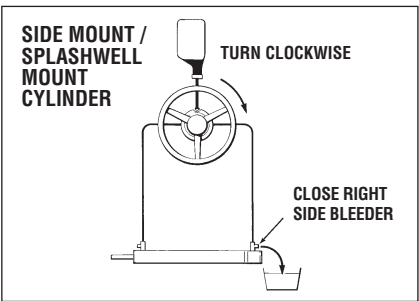
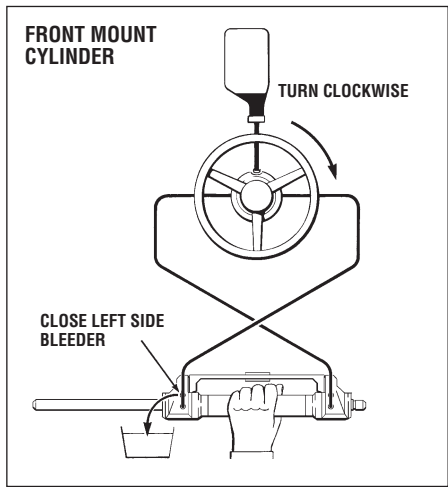
- Continue turning the steering wheel counter-clockwise until the cylinder rod is fully extended to the left. (Steering wheel will come to a stop).
- Open the left bleeder.



Step 5

- Holding the cylinder body (Front Mount cylinder) or rod (Side Mount cylinder) to prevent the body/rod from moving, turn the steering wheel clockwise until a steady stream of air free oil comes out of the bleeder.
- While continuing to turn the wheel close the left side bleeder and let go of the cylinder body/rod.

⚠ CAUTION
Prior to operating system, perform Oil Level System Check, refer to page 51.



When steering system has been properly bled, steering wheel turns will be as shown in the chart.

No. Steering Wheel Turns	Front Mount	Side Mount	Splashwell Mount
SeaStar 1.7	4.5	4.9/5.8	5.5/6.5
SeaStar 2.4	3.25	3.5/4.1	3.9/4.6
SeaStar Pro 2.0	4.0	N/A	N/A

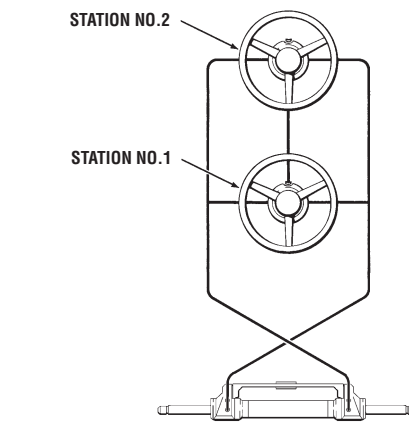
Twin Station Single Cylinder

Perform steps 1 through 5 at station no. 1. Then repeat steps 1-5 at station no. 2.

Oil requirements 4-5 bottles.

Note: Refer to Oil Level and System Check page 51.

When properly bled, steering wheel turns will be as shown in the chart.



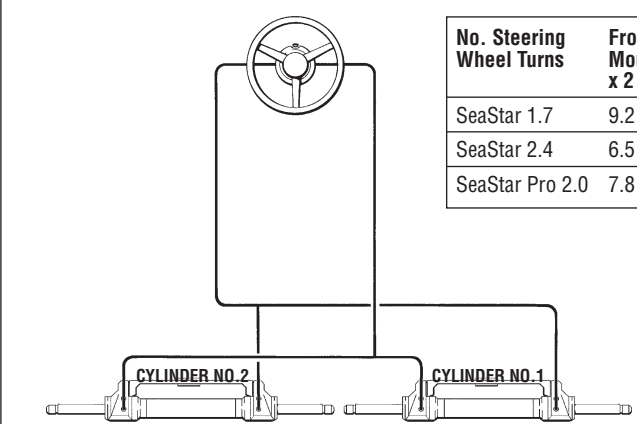
No. Steering Wheel Turns	Front Mount	Side Mount	Splashwell Mount
SeaStar 1.7	4.5	4.9/5.8	5.5/6.5
SeaStar 2.4	3.25	3.5/4.1	3.9/4.6
SeaStar Pro 2.0	4.0	N/A	N/A

Single Station Twin Cylinder

When performing steps 1 through 5, perform instructions in each step first on cylinder no. 1 and then on cylinder no. 2, before proceeding to the next step. ie: Perform instructions referring to right side of cylinder first on cylinder no. 1 and then on cylinder no. 2.

Oil requirements 4-5 bottles.

Note: Refer to Oil Level and System Check on page 51. Steering wheel turns will be as shown in the chart.

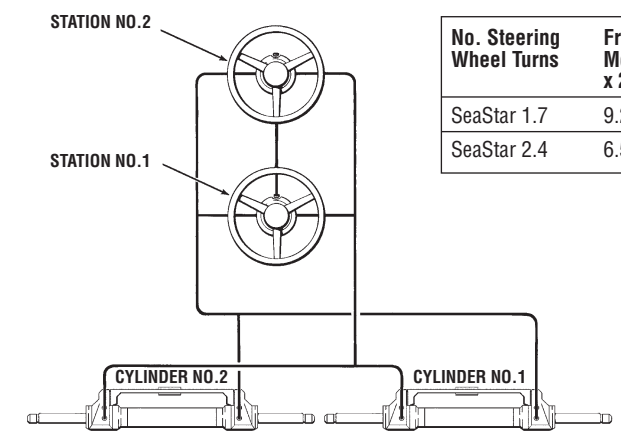


No. Steering Wheel Turns	Front Mount x 2	Side Mount x 2	Splashwell Mount x 2
SeaStar 1.7	9.2	10.7	10.7
SeaStar 2.4	6.5	7.5	7.75
SeaStar Pro 2.0	7.8	9	N/A

Twin Station Twin Cylinder

Follow same procedure as instructed for single station-twin cylinders, beginning at station no. 1, and repeat entire procedure at station no. 2.

Note: When properly bled, steering wheel turns will be as shown in the chart.



No. Steering Wheel Turns	Front Mount x 2	Side Mount x 2	Splashwell Mount x 2
SeaStar 1.7	9.2	10.7	10.7
SeaStar 2.4	6.5	7.5	7.75

Oil Level and System Check

CAUTION

Side mount/splashwell mount cylinders are unbalanced. The oil level in the helm must be set with the cylinder rod fully retracted. Failing to observe this caution will result in a oil spill at the helm. Turning the wheel to port (left) will retract the cylinder rod.

Helm mounted with wheel shaft completely horizontal must be filled to bottom of filler hole at all times. DO NOT allow oil level to drop more than 1/4" (6.3mm)

Helms mounted on a 20° angle or with wheel shaft vertical, oil level should be within 1/2" (12.7mm) of hole. Check oil level periodically.

At this time the steering system must be checked for proper connections of hose, tube and fittings, possible leaks, and air removal. To do so, turn steering wheel (any one on a multi-steering station) and pressurize very hard to port. Apply enough force to the wheel to exceed pressure relief valve pressure. You will not harm the system. While pressure is maintained on steering wheel, check all port (left) fittings and line connections for leaks. If no leaks are obvious your steering system is ready for use. If leaks are found, correct before using. Failure to correct leak will lower oil level in system and could result in loss of steering. Repeat procedure by turning wheel to starboard. Watch the oil level in the helm pump when the steering wheel reaches either hard over positions. If there is no obvious drop in oil level, air has been removed. If there is an obvious drop in oil level, you are compressing air and further filling and purging is required. Repeat Steps 1 through 5.

CAUTION

Ensure that the cylinder can be fully stroked in both directions and in all tilt and trim positions without stretching or kinking the hydraulic hoses.

If interference occurs during engine tilt or trim between steering cylinder and splashwell or jackplate, contact your engine manufacturer for trim restrictors or a Tilt Stop Switch.

CAUTION

Failure to check for interference may result in cylinder, splashwell and/or engine damage.

MAINTENANCE

NOTICE

It is good boating practice to rinse off your steering cylinder thoroughly with fresh, clean water after each use.

Remove, clean & grease the support rod annually with quality marine grease.

Check the steering fluid level in the helm, it should be maintained at no less than 1/2" and no more than 1/8" below the bottom of the filler cap threads. Be careful not to overfill.

Replace any hoses showing signs of wear and remove the cause or re-route hoses.

Check fittings & seal locations for leaks/damage and service as necessary.

If you have installed a jack plate make sure that there isn't any interference between the jack plate and your steering cylinder. If there is interference, it may occur during full tilt. Lift restrictors or a Tilt Stop Switch should be installed. Please consult your engine manufacturer.

⚠ WARNING

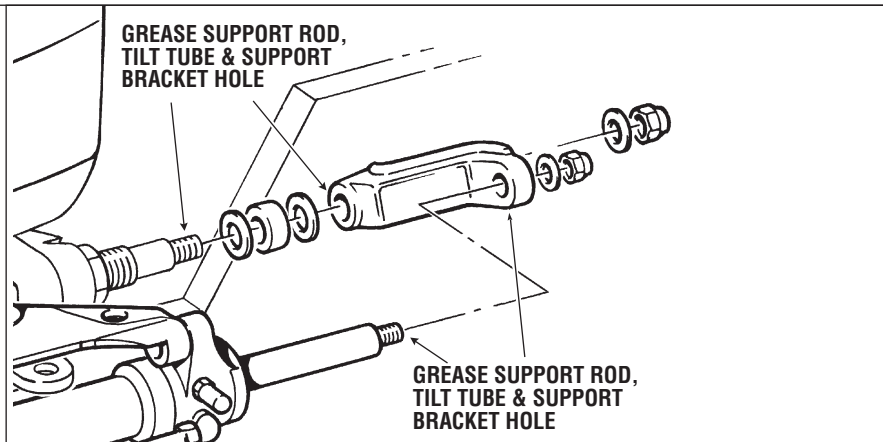
Failure to comply with maintenance checks may result in loss of steering, causing property damage and/or personal injury.

Maintenance requirements will vary depending on usage and climate. Bi-annual inspection by a qualified marine mechanic is required.

LUBRICATING INSTRUCTIONS

⚠ CAUTION

Grease rod, tilt tube and support bracket holes once a year.



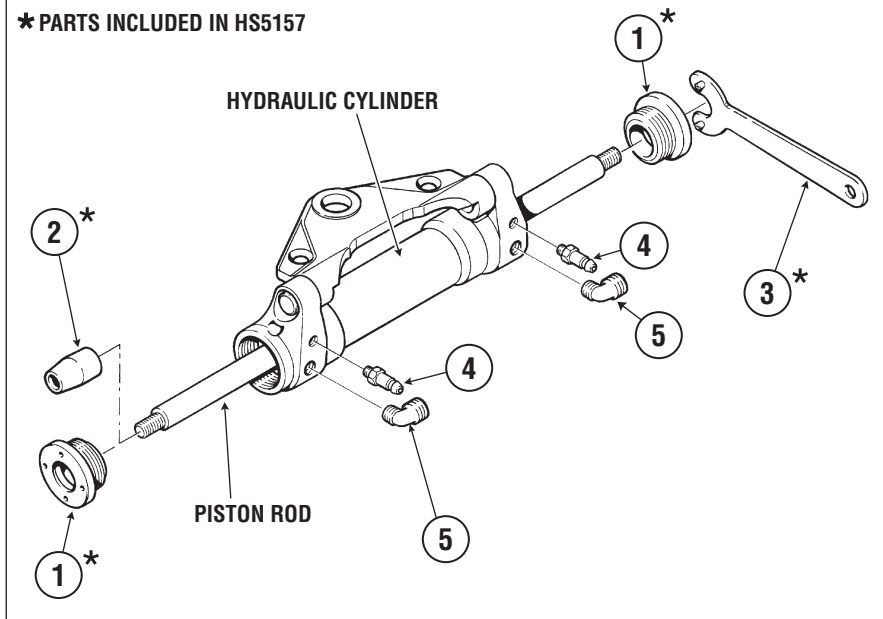
SEAL REPLACEMENT KIT (Part # HS5157) for: Front Mount Cylinder (Part # HC5345/47/48/58)

ITEM	PART#	QTY	DESCRIPTION
1	797021	2	Seal Gland Only
2	745920	1	Seal Gland Assbly. Guide Tool
3	745525	1	Pin Wrench Only
4	828980	1	Bleeder Fitting
5	600620	1	Elbow Fitting

SEAL KIT # HS5157

1	797021	2	Seal Gland Only
2	745920	1	Seal Gland Assbly. Guide Tool
3	745525	1	Pin Wrench Only

* PARTS INCLUDED IN HS5157



TROUBLE SHOOTING GUIDE

WARNING

Whenever in the following text, a solution calls for removal from vessel and/or dismantling of steering system components, such work must only be carried out by a qualified marine hydraulic mechanic.

Teleflex offers the following as a guide only and is not responsible for any consequences resulting from incorrect dismantling repairs.

SeaStar hydraulic steering will provide years of safe reliable performance with a minimum of service if properly installed with correct cylinder.

SeaStar steering systems have been designed with protection against over-pressure situations by a pressure relief valve.

Most faults occur when the installation instructions are not followed and usually show up immediately upon filling the system. Below are the most common faults and their likely cause and solution.

Sometimes when returning the wheel from a hardover position, a slight resistance may be felt and a clicking sound heard. This should not be mistaken as a fault, as it is a normal situation caused by the release of the lockspool.

FAULT	CAUSE	SOLUTION
1. During Filling, the helm becomes completely jammed.	Blockage in the line between the helm(s) and the cylinder(s).	Make certain that hose has not collapsed during installation. If so, the collapsed section must be removed and re-fitted with a new piece with the aid of tube connectors. Check fittings for incomplete holes. Fittings with incomplete holes, however, are not common.
	Using unbalanced (side mount/splashwell mount) cylinder with SeaStar Pro Helm.	Use balanced cylinder or Standard SeaStar Helm.
2. System is very difficult to fill. Air keeps burping out top of helm even after system appears full.	Cylinder(s) has been mounted upside down. This causes air to be trapped in the cylinder(s).	Mount cylinder(s) correctly, according to cylinder installation instruction. Ports should always be kept in uppermost position.
	Air in system.	Review filling instructions.
	Bleed fitting leaking. Coiled hose.	Tighten bleed fitting. Uncoil or straighten the hydraulic hose.
3. Steering is stiff and hard to turn, even when the vessel is not moving.	Knurled adjusting nut on tilt tube over-tightened.	To test, disconnect cylinder(s) from the tiller arm and turn the steering wheel. If it turns easily, correct above-mentioned problems. Please note that excessively loose connections to tiller arm or tie-bar can also cause mechanical binding.
	Restrictions in hose, tubing or fittings.	Find restriction and correct. Note: A kinked hose will cause stiff steering and should be replaced.
	Cylinder interfering with engine cowling. Air in oil.	Loose adjusting nut. See filling instructions supplied with helm units.
	Wrong oil has been used to fill steering system, like A.T.F. (automatic transmission fluid, or any other oil with a high viscosity factor).	Drain system and fill with recommended oils.

HYDRAULIC STEERING

TROUBLE SHOOTING

FAULT	CAUSE	SOLUTION
4. One helm unit in system is very bumpy and requires too many turns from hardover to hardover.	Dirt in inlet check of helm pump.	Dismantle check valves and remove contaminant. Refer to Fault #6.
5. Steering is easy to turn at the dock, but becomes hard to turn when vessel is underway.	Steering wheel is too small. Incorrect setting of trim tab(s) engine.	Fit larger wheel if possible, see installation instructions. If the problem cannot be rectified by the above mentioned solution, proceed with next cause and solution or consult factory. Adjust tab(s).
6. Engine drifts to port or starboard while vessel is underway, even when wheel is not being turned.	Dirt in check valves.	Remove check valve plugs. These are the larger plugs on either side on rear of helm. Clean ball seats and balls and re-assemble. Note: Be prepared to lose a certain amount of oil during this procedure. Have a small can available. Refill and purge system when check valves have been re-assembled.
7. Turning one wheel causes second steering wheel to rotate.	See fault No. 6.	See fault No. 6.
8. Seals will sometimes leak if steering system is not vented at uppermost helm.		The SeaStar helm has a field replaceable wheel shaft seal which can be readily replaced by removing the steering wheel and seal cover held in place by three small screws. Quad ring no. 210 is found in SeaStar helm seal kit HS5151. NOTE: Seal kits are available for SeaStar cylinders, however, these must only be used by a qualified marine mechanic.

TECHNICAL INFORMATION

Bolt Torque Specifications

These are the recommended maximum torque values for reusable dry bolts. Bolts should be torqued to this value +0% -20%. For lubricated bolts, multiply the dry bolt torque values by .75.

Values are stated in: **in/lbs (N.m)**

Bolt Size	18-8SS	Brass	Bolt Size	18-8SS	Brass	Bolt Size	18-8SS	Brass
2-56	2.5 (.282)	2.0 (.226)	6-32	9.6 (1.08)	4.9 (.554)	5/16"-18	132.0 (14.91)	107.0 (12.10)
2-64	3.0 (.338)	2.5 (.282)	6-40	12.0 (1.35)	9.9 (1.12)	5/16"-24	142.0 (16.04)	116.0 (13.11)
3-48	3.9 (.440)	3.2 (.361)	8-32	20.0 (2.25)	16.0 (1.81)	3/8"-16	236.0 (26.66)	192.0 (21.71)
3-56	4.4 (.497)	3.6 (.407)	8-36	22.0 (2.48)	18.0 (2.03)	3/8"-24	259.0 (29.20)	212.0 (23.97)
4-40	5.2 (.587)	4.3 (.486)	10-24	23.0 (2.59)	19.0 (2.14)			
4-48	6.6 (.740)	5.4 (.610)	10-32	32.0 (3.61)	26.0 (2.94)			
5-40	7.7 (.869)	6.3 (.712)	1/4"-20	75.0 (8.47)	62.0 (7.01)			
5-44	9.4 (1.06)	7.7 (.869)	1/4"-28	94.0 (10.6)	77.0 (8.70)			

Values are stated in: **ft/lbs (N.m)**

Bolt Size	18-8SS	Brass	Bolt Size	18-8SS	Brass	Bolt Size	18-8SS	Brass
7/16"-14	31.0 (42.00)	26.0 (35.25)	5/8"-11	93.0 (126.09)	76.0 (103.04)	1"-8	287.0 (389.12)	235.0 (318.62)
7/16"-20	33.0 (44.74)	27.0 (36.61)	5/8"-18	104.0 (141.00)	85.0 (115.24)	1"-14	259.0 (351.16)	212.0 (287.43)
1/2"-13	43.0 (58.30)	35.0 (47.45)	3/4"-10	128.0 (173.55)	104.0 (141.00)			
1/2"-20	45.0 (61.01)	37.0 (50.17)	3/4"-16	124.0 (168.12)	102.0 (138.29)			
9/16"-12	57.0 (77.28)	47.0 (63.72)	7/8"-9	194.0 (236.03)	159.0 (215.58)			
9/16"-18	63.0 (85.42)	51.0 (69.15)	7/8"-14	193.0 (261.67)	158.0 (214.22)			

NOTICE Torque values for 18-8 stainless steel and brass bolts are taken from a torque guide by ITT Harper. All results correspond well with basic bolt equations, using a bolt factor of 0.2 and a factor of 3/4 for a reusable connection.

Helm Pump

SeaStar 1.7
SeaStar 2.4
SeaStar Pro 2.0

DISPLACEMENT

1.7 cu. in. (27.8 cc)
2.4 cu. in. (39.3 cc)
2.0 cu. in. (33.0 cc)

RELIEF VALVE

1000 PSI (68 Bar)
1000 PSI (68 Bar)
1500 PSI (102 Bar)

PORTS

1/4" NPT
1/4" NPT
1/4" NPT

Helm Pump Shaft

SeaStar 1.7
SeaStar 2.4
SeaStar Pro 2.0

TAPER

3/4" Standard, 1" per ft.
3/4" Standard, 1" per ft.
3/4" Standard, 1" per ft.

THREAD

5/8" NF
5/8" NF
5/8" NF

KEY SIZE

3/16"
3/16"
3/16"

Cylinder

Front Mount (*Pivot, PRO Pivot, Tournament Pivot*)
Side Mount
Splashwell Mount

INSIDE DIAMETER

1.375" (34.93 mm)
1.250" (31.70 mm)
1.250" (31.70 mm)

STROKE

8" (203 mm)
8" (203 mm)
9" (229 mm)

VOLUME

8.34 cu. in. (136.6 cc)
8.25/9.8 cu. in. (135.1/160.8 cc)
9.3 cu. in. (152.4 cc)

TORQUE @ 1000 psi (70 Bar) H.O.

N/A
7142/8502 in/lbs (82.1/97.7 Kg)
N/A

Fittings

SeaStar cylinders and all other fittings are 3/8" compression type fittings. Threads are 9/16" x 24 UNEF. A brochure on all SeaStar fittings is available from Teleflex Canada.

SeaStar & SeaStar Pro Hose

Inside diameter – 5/16" (8 mm)

SEAL REPLACEMENT/ FITTING KITS

FRONT MOUNT CYLINDER

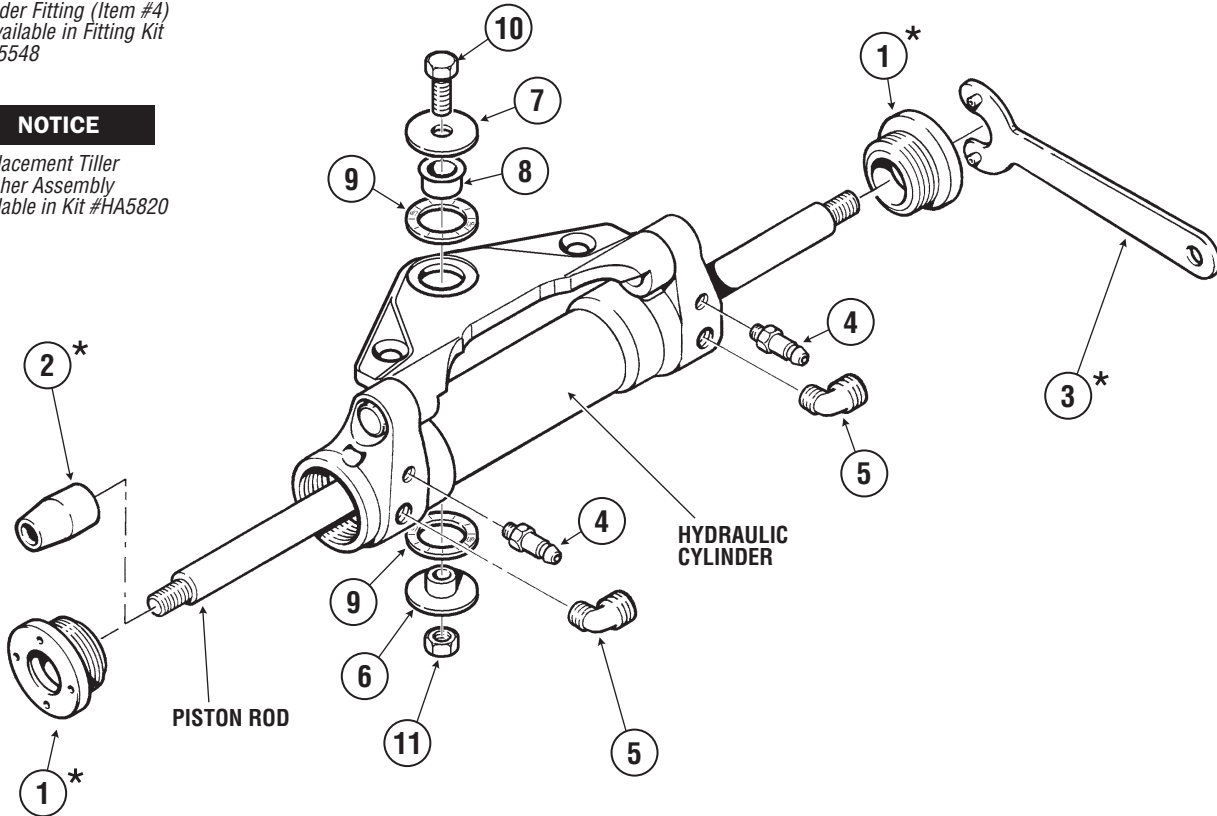
Part # HC5345, HC5347, HC5348, HC5358

NOTICE

Bleeder Fitting (Item #4)
is available in Fitting Kit
#HF5548

NOTICE

Replacement Tiller
Washer Assembly
available in Kit #HA5820



* PARTS INCLUDED IN HS1517

ITEM	PART#	QTY	DESCRIPTION
1	797021	2	Seal Gland Only
2	745920	1	Seal Gland Assembly Guide Tool
3	745525	1	Pin Wrench Only
4	828980	2	Bleeder Fitting
5	600620	2	Elbow Fitting

SEAL KIT # HS1517

1	797021	2	Seal Gland Only
2	745920	1	Seal Gland Assembly Guide Tool
3	745525	1	Pin Wrench Only

TILLER BUSHING KIT # HA5820

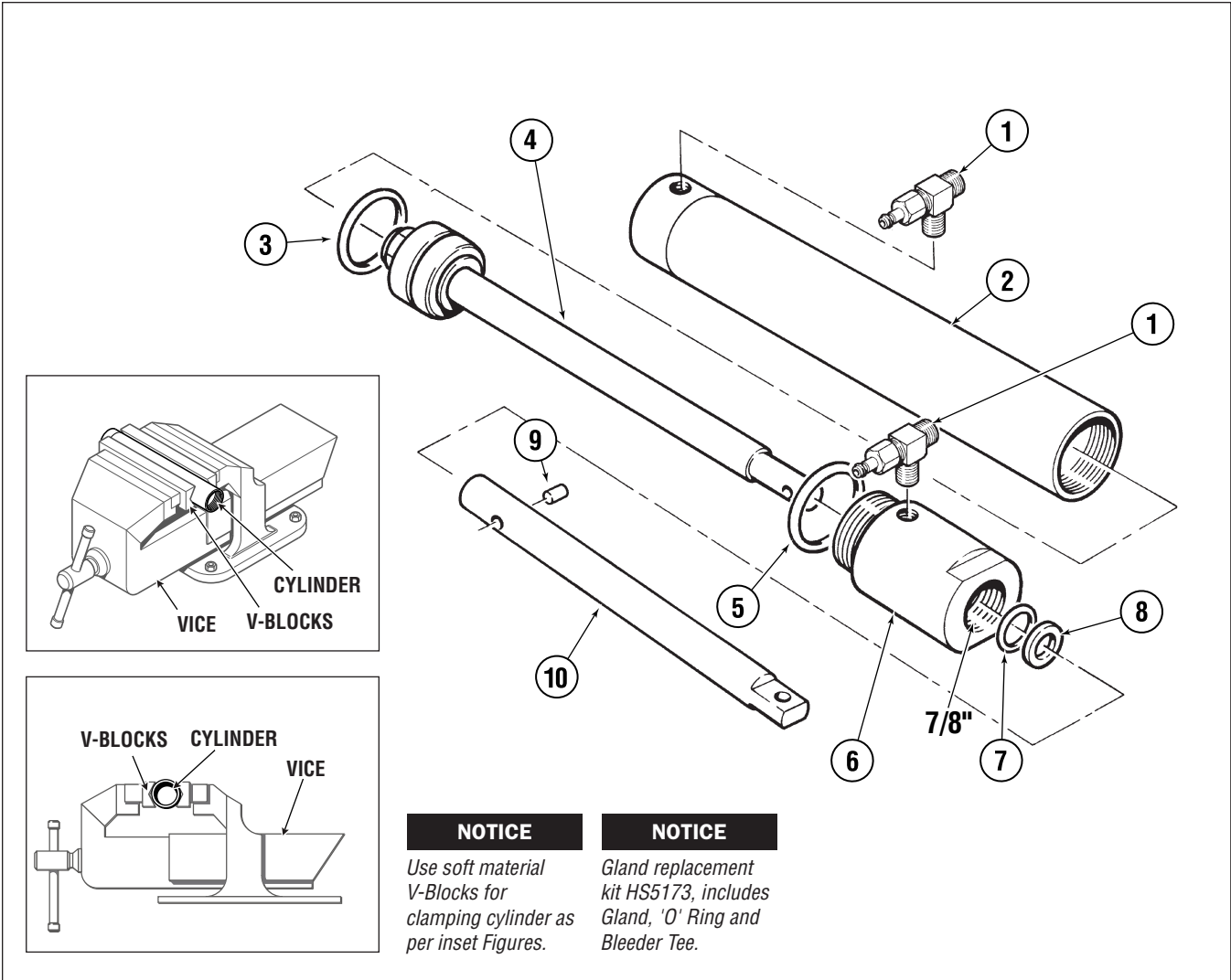
6	739123	1	Washer, Bush, SS
7	922221	1	Washer, Snap, SS
8	828010	1	Bush, Tiller, Nylon
9	890968	2	Washer, Nylon
10	113225	1	HHCS 3/8UNJFX1.35 HSS
11	113529	1	Nut, Nylok®

FITTING KIT # HF5548

4	828980	2	Bleeder Fitting
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SIDE MOUNT CYLINDER

Part # HC5370



NOTICE
Use soft material V-Blocks for clamping cylinder as per inset Figures.

NOTICE
Gland replacement kit HS5173, includes Gland, 'O' Ring and Bleeder Tee.

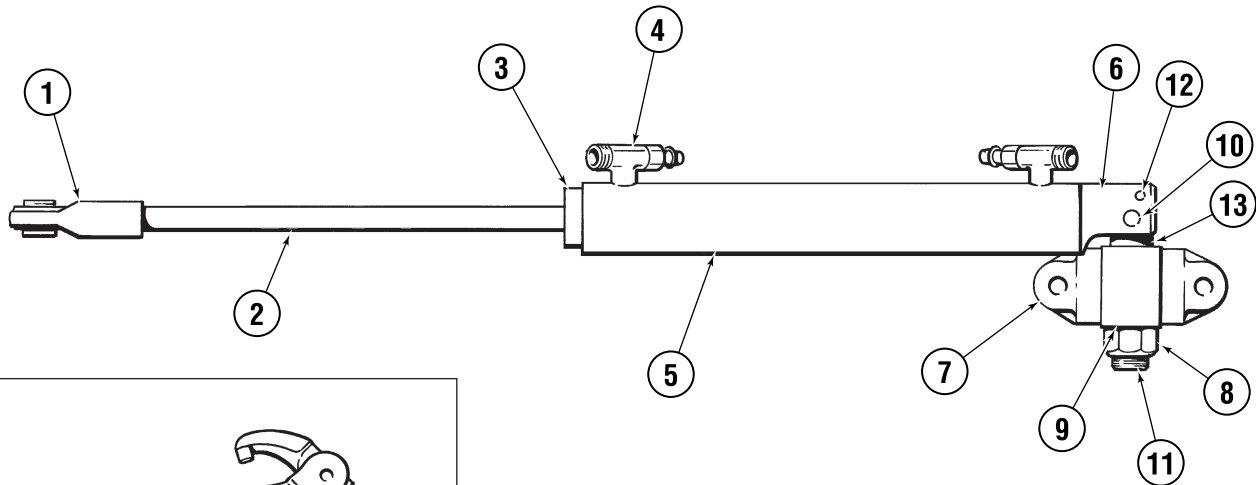
ITEM	PART#	QTY	DESCRIPTION
1	409620	2	Bleeder Tee Assembly
2	450022	1	Cylinder Barrel / Gland Assembly
3	029620	1	O-Ring (Piston Seal)
4	449928	1	Piston Rod (Shaft Only)
5	469828	1	O-Ring (Rod-End Gland Seal)
6	447321	1	Gland End
7	449627	1	O-Ring (Shaft Seal)
8	215121	1	Wiper Ring
9	449721	1	Pin
10	449824	1	Extension Rod

SEAL KIT # HS5153			
3	029620	1	O-Ring (Piston Seal)
5	469828	1	O-Ring (Rod-End Gland Seal)
7	008727	1	O-Ring (Shaft Seal)
8	215121	1	Wiper Ring
11	002222	1	O-Ring (Piston Rod Seal) (Not Shown)

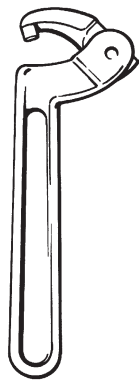
SEAL REPLACEMENT KITS

SPLASHWELL MOUNT

SPLASHWELL MOUNT CYLINDER Part# HC5380



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NOTICE

THIS ITEM IS NOT AVAILABLE FROM TELEFLEX.
It is available through a Granger Distributor.
Part number C492, 3/4"-2" Spanner Pin Wrench

⚠ WARNING

WHEN REPLACING ANY SEALS, MAKE SURE SHAFT IS CLEAR OF ANY ABRASIONS

ITEM	PART#	QTY	DESCRIPTION
1	341624	1	Rod End Ball
2	640821	1	Piston/Shaft
3	008229	1	Gland Tee
4	HF5520	2	Bleed Tee
5	640925	1	Barrel
6	641222	1	Gland Clevis
7	641129	1	Bracket Mounting
8	192126	1	1/2" Nut, NF
9	202224	1	Washer
10	641523	1	Pin Clevis
11	641420	1	Pin Pivot
12	641721	1	Pin Spring
13	641326	2	Bushing
23	N/A	1	Spanner Wrench

SEAL KIT # HS5154
Seals Only

Statement of Limited Warranty

We warrant to the original retail purchaser that **Teleflex Canada Limited Partnership** products have been manufactured free from defects in materials and workmanship. This warranty is effective for two years from date of purchase, excepting that where **Teleflex Canada Limited Partnership** products are used commercially or in any rental or income producing activity, then this warranty is limited to one year from the date of purchase.

We will provide replacement product without charge, for any **Teleflex Canada Limited Partnership** product meeting this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such product were purchased, or to us at the appropriate address. In such a case **Teleflex Canada Limited Partnership** products found to be defective and covered by this warranty, will be replaced at **Teleflex's** option, and returned to the customer.

The above quoted statement is an extract from the complete **Teleflex Canada Limited Partnership** products warranty statement. A complete warranty policy is available in our **Teleflex Canada Limited Partnership** products catalogue.

Return Goods Procedure

Prior to returning product to **Teleflex Canada Limited Partnership** under warranty, please obtain a *Return Goods Authorization number* (claim number).

Be sure to label the goods with:

- a) the name and address of the sender, and
- b) the return goods authorization number (claim number)

Please address the returned goods as follows:

From U.S.A.

RGA # ?
Teleflex Canada
c/o UPS-SCS Warehouse
1927 Boblett Street
Blaine, WA 98230

From Canada

RGA # ?
Teleflex Canada
3831 No.6 Road
Richmond, B.C.
Canada V6V 1P6

Teleflex®

MARINE

TELEFLEX CANADA
3831 NO.6 ROAD
RICHMOND, B.C.
CANADA V6V 1P6

FAX 604-270-7172

www.seastarsteering.com

ISO 10592



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